AUTOMOTIVE INDUSTRIES

Founded 1895

Vol. 74, No. 24

June 13, 1936

This Week

Don Blanchard worked overtime with his candid camera at the S. A. E. Summer Meeting so there are some pictures of high interest on pages 826 and 827.

The automobile industry has a trailer offspring that is growing into an unusually healthy child. Philip H. Smith gives a vivid picture of the youngster just emerging from swaddling clothes to adolescent production lines. Page 830.

Changes in the specifications of American Passenger Cars. Pages 842 and 843.

More papers presented at the S. A. E. Summer Meeting. See page 844.

May Sales Down Only 2%

Operating Rates Now Indicate a Slight Decline in the Current Month's Output

By Harold E. Gronseth

Unexpected strength of demand for motor vehicles was revealed by the final delivery figures for May. Car manufacturers were, of course, aware of the big volume of business their dealers were doing last month, but the strong finish disclosed by results for the final reporting period was a little beyond their expectations. It has encouraged the belief that probably less than normal seasonal decline will occur in sales during June.

While some companies succeeded in topping their April totals last month, April still stands as the peak month of the year for the industry as a whole. May, however, ran a close race, coming within 2 per cent of the April volume, according to preliminary estimates.

Less than 10,000 cars and trucks is believed to be the difference between the two months. Whether or not they all found their way into May registrations, deliveries of 385,000 passenger cars and 62,000 trucks are indicated by factory records. The combined volume of 447,000 units compares with 456,000 units in April.

Plants are still operating at rates that indicate a June output only 10 per cent under that of May. Practically all manufacturers have made commitments for materials covering the balance of the current model year, so that the industry's output for the summer months is now a settled matter. The scheduled output for the remainder of the model season will be spread according to the rate of deliveries. If demand holds up exceptionally strong, as now indicated, current manufacturing programs will be completed by the end of the summer and the "clean-up" will be complete. In that case, some new model announcements may be moved forward, but according to present plans

(*Turn to page* 824, *please*)

French Cars "Tax Engineered"

Competition with U. S. Cars Impossible, Says Goudard; Kettering Sees "Technical Renoissance" Near

Speaking at a dinner in his honor at the Detroit Yacht Club, Wednesday evening, M. Maurice Goudard, president of the Société des Ingénieurs de l'Automobile, of France, freely admitted that it was impossible for the French automobile industry to compete with American built automobiles. For years, he said, he had preached to engineers in his country that their only hope of successful competition was in the development of cars that would appeal to a market not touched by American automobiles. A two-seated car that could do 40 miles to a gallon and with top speed of 50 miles was the objective he held out to French manufacturers.

"For a long time in France the chief engineer of the automobile industry was the tax collector," said M. Goudard. "High horsepower taxation influenced design and hampered normal development of the industry, but after a 10-year fight, we finally succeeded in getting rid of this tax," he added. He blamed the tax situation and the six years of inactivity during the war for the loss of France's supremacy in the field of automotive engineering.

M. Goudard was guest of the Society of Automotive Engineers at the dinned attended by outstanding men in the American automotive industry. Ralph R. Teetor, S.A.E. president, and Vincent P. Rumely, vice-chairman of the Society's Detroit section, welcomed the distinguished visitor. Charles F. Kettering, S.A.E. past president, gave a short address and after the dinner invited those present to be his guests aboard his yacht, the *Olive K.*

"People of the U. S. Buy automobiles not because they need them, but because for some strange reason they seem to want them," declared Kettering. "If we could teach industrialists in general," he said, "what we of the automotive industry have learned,

(*Turn to page* 825, *please*)

Auburn Appointments

A. H. McInnis has been elected vice-president and director of the Auburn Automobile Co. to succeed H. T. Ames, who has resigned in order to take similar posts in the Cord Corp. R. S. Wiley, formerly export sales manager, has been appointed general sales director, and L. R. Jones has been named chief engineer. L. R. Jones has been named chief engineer, succeeding H. C. Snow. Mr. Jones has been with Auburn about six months, and was previously chief engineer of Pierce-Arrow.

Diamond T Has ¾ Ton Truck

New Model 80 Chassis Has 6-Cyl. L-Head Engine And Is Priced at $525

A new three-quarter ton truck, the Model 80, has been announced by the Diamond T Motor Car Co. The Model 80 standard chassis has a wheelbase of 119 in. The rear axle is of full floating design, with a spiral bevel drive and a standard ratio of 4.5 to 1. A ratio of 5.1 to 1 is also available.

The truck is powered by a six-cylinder engine, having a bore of 3⅛ in. and stroke of 4⅛ in. The rated hp. is 23.44 and the piston displacement 190 cu. in. The engine is of L-head design with cylinder block and upper crank case cast in one piece. The 2½ in. crankshaft is carried in seven main bearings having a total area of 70 sq. in. Force-feed lubrication is employed to all main and connecting rod bearings.

Diamond T Model 80 trucks are equipped with internal expanding hydraulic brakes on all four wheels. The clutch is of the single plate type, 10 in. in diameter. Steering is by cam and lever. Front springs have eight leaves, 2 in. by 38 in., and the underslung rear springs have nine leaves, 2 in. wide by 53 in. in length. A speed of 60 m.p.h. is claimed for the truck. The weight of the chassis is 2750 lb. with 480 lb. additional for the cab. Bodies from 7 to 8 ft. in length can be accommodated.

The standard chassis is priced at $525 and the de luxe model, $568.

Way Clear for Enactment Of Patman-Robinson Bill

Enactment of the Patman-Robinson anti-price discrimination bill at the present session of Congress appears to be assured now that Senate and House conferees have agreed upon a report. Following its recess, Congress will reconvene next Monday and the report will be presented for adoption, first in the House and then in the Senate, in time for final action before adjournment.

The outstanding difference between the two measures was the inclusion in the Senate bill of the Borah-VanNuys amendment and its omission from the House bill. The House conferees accepted the amendment. It calls for a criminal penalty and a fine up to $5,000 and imprisonment up to one year for violating its provisions which prohibits discriminating against competitors by a discount, rebate, allowance or advertising service, or to sell goods in any part of the United States at prices lower

(*Turn to page 854, please*)

Tire Industry's Proposed Code

Federal Trade Commission to Pass on Fifteen Rules Drawn Up by Chicago Conference

By Ralph C. Busbey

The Federal Trade Commission is expected soon to project a code of ethics for tire manufacturers and marketers, based upon the 15 proposed fair trade rules submitted to it at the industry's trade practice conference held June 4 in Chicago. Such rules as the Commission may accept

Truck Exports Up 25% This Year

Commercial Vehicles Show Greatest Increase During First Four Months; Passenger Car Shipments Slightly Higher

Exports and Imports of the Automotive Industry for April and Four Months Ended April, 1936-1935

	April				Four Months Ended April			
	1936		1935		1936		1935	
EXPORTS	Number	Value	Number	Value	Number	Value	Number	Value
Motor Vehicles, parts and accessories	....	$22,972,198	....	$22,016,562	....	$91,152,902	....	$84,794,636
PASSENGER CARS								
Passenger cars and chassis	17,583	10,152,605	18,341	9,979,336	68,089	39,524,465	65,427	36,414,104
Low price range $850 inclusive	15,925	8,294,871	17,234	8,777,056	62,014	32,786,690	60,832	31,301,475
Medium price range over $850 to $1,200	1,343	1,282,245	824	793,945	5,063	4,856,111	3,380	3,245,742
$1,200 to $2,000	203	295,838	114	172,771	672	982,241	524	812,950
Over $2,000	112	279,651	72	197,658	349	899,423	346	916,696
COMMERCIAL VEHICLES								
Motor trucks, buses and chassis (total)	8,258	4,264,963	8,092	4,136,797	37,883	18,972,754	30,269	15,775,552
Under one ton	1,494	583,910	831	263,969	5,688	2,107,085	2,576	804,017
One and up to 1½ tons	5,283	2,464,449	5,787	2,552,829	24,637	11,294,412	22,471	9,963,717
Over 1½ tons to 2½ tons	1,244	879,152	1,209	952,784	5,167	3,651,394	4,301	3,883,460
Over 2½ tons	228	295,756	189	292,449	1,141	1,425,046	742	1,418,580
Bus chassis	54	41,696	....	.....	1,250	494,817	....	.....
PARTS, ETC.								
Parts except engines and tires	....	.....	....	.....	....	.....	....	.....
Automobile unit assemblies	....	5,003,681	....	4,482,539	....	18,748,779	....	20,501,687
Automobile parts for replacement (n.e.s.)	....	2,334,913	....	2,235,498	....	8,364,338	....	8,205,607
Automobile accessories (n.e.s.)	....	262,026	....	294,915	....	1,108,566	....	1,054,270
Automobile service appliances	....	331,623	....	406,728	....	1,391,014	....	1,338,829
Airplanes, seaplanes and other aircraft	32	368,134	32	684,036	114	1,801,043	128	3,426,629
Parts of airplanes, except engines and tires	....	317,829	....	425,047	....	1,272,114	....	1,549,899
INTERNAL COMBUSTION ENGINES Stationary & Portable								
Diesel and semi-Diesel	26	28,341	17	51,879	135	483,078	113	275,974
Other stationary and portable	....	.....	....	.....	....	.....	....	.....
Not over 10 hp.	846	52,786	550	38,114	3,570	24,299	2,717	167,895
Over 10 hp.	136	66,433	110	57,723	1,010	343,648	445	266,912
Automobile engines for:								
Motor trucks and buses	964	98,330	670	114,802	9,899	953,753	1,302	218,709
Passenger cars	4,646	254,310	4,133	266,114	21,615	1,488,146	11,755	760,211
Engines and aircraft	38	135,210	51	215,786	214	1,028,820	159	537,766
Accessories and parts (carburetors)	....	186,098	....	145,475	....	658,843	....	517,850
IMPORTS								
Automobile and chassis (dutiable)	56	19,271	41	14,921	205	81,744	146	76,406

and promulgate will be divided into two groups—one consisting of rules, violation of which could be punishable by law and in which cases the Commission would proceed against the violators; and the other of rules voluntarily obeyed by the industry, without recourse to law in event of violation.

Commissioner R. E. Freer presided at the industry's conference which was sponsored by the National Association of Independent Tire Dealers. The 15 proposed rules would declare the following practices as unfair competition:

1—Price descrimination between purchasers where the effect might be to lessen competition in restraint of trade, or might tend to create monopoly.

2—Defamation of competitors.

3—Selling below cost.

4—Deceptive guarantees; misrepresentation in advertising.

5—False or deceptive marking or branding of products for the purpose

(*Turn to page 852, please*)

AMA May Sales Show Small Drop

Six Per Cent Under April But 49 Per Cent Above Year Ago; Five Months' Sales Set Seven Year Mark

Although following a seasonal decline 6 per cent below the April figures, the May factory sales for members of the Automobile Manufacturers Association were estimated at a total of 371,294 cars and trucks, and represented an increase of 49 per cent over the 249,835 units sold during the corresponding month last year.

Factory sales for the group during the first five months amounted to approximately 1,592,381 units as compared with 1,261,668 units during the first five months of 1935.

On the basis of these estimates from the association, factory sales both for May and for the first five months have been exceeded but twice in history, in 1928 and 1929.

The huge salt spray chamber, large enough to accommodate any part of the car, is lined with glass bricks to prevent corrosion of interior

Ford's New Laboratories

Stainless Steel Tables, Benches, Wall Linings, Fixtures Make Place an Experimenter's Paradise

By Joseph Geschelin

The answer to an industrial scientist's dream will be found in the new laboratories recently placed in service at the Ford Motor Company's Rouge plant. Some idea of the size of the main laboratory section may be gained from the fact that one unit is 30 ft. wide and 300 ft. in length while another is 30 ft. by 87 ft., the total floor space in this division being 11,610 sq. ft. The laboratories are completely air-conditioned and illuminated by a special overhead lighting system.

The X-ray laboratory is equipped with a 280,000 volt machine fitted with a new oil-cooled tube. This section is provided with all the necessary accessory equipment including photographic dark rooms protected by labyrinth passages.

The central section houses an extraordinarily well equipped mechanical testing laboratory comprising the latest types of machines known to the art. Among the equipment in this department one will find the following:

Vickers, Brinell, and Rockwell hardness testers.

Olsen 50-ton hydraulic testing machine suitable for tensile, compression and deflection tests.

Cold bending machine, Izod impact tester, Steel City ductility machine, 250 lb. Scott vertical machine for tensile tests on rubber products such as hose, tires, tubes, etc.

Olsen impact test for fatigue investigations, Baldwin-Southwark fatigue machine for vibration tests on driveshaft tubes, axle housings, etc. Amsler abrasion machine, for wear tests on metals.

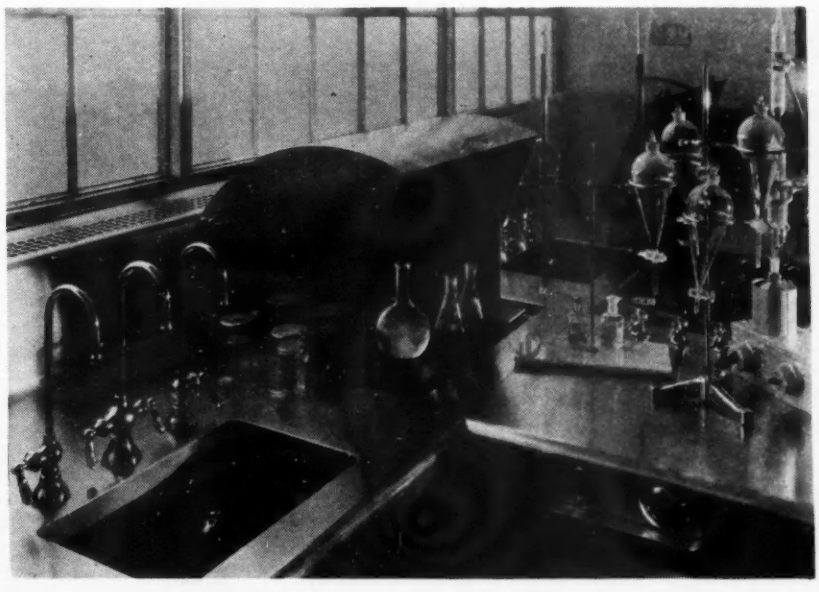
Olsen torsion machine of 232,000 in. lb. capacity for crankshafts, front axles and torque tubes. Olsen vibration machine for fatigue testing of coil springs, leaf springs, valve springs, muffler brackets, etc.

100-ton Riehle testing machine for tensile, compression, and deflection tests.

The largest section is devoted to chemical and metallurgical research. Row upon row of tables and work benches, are executed in stainless steel. Every piece of equipment, including furnace stands and hoods, is shrouded

(*Turn to page 853, please*)

Completeness of appointments and fittings in the Ford laboratory is shown in this work station. At the right is an electric hot-plate built flush with the table. Individual taps provide water, hot, cold, distilled and iced



Business in Brief

Written by the Guaranty Trust Co., New York, exclusively for AUTOMOTIVE INDUSTRIES

There was a moderate recession in general business activity last week. However, retail trade registered a further gain, and wholesale business was estimated at from 18 to 20 per cent above that in the corresponding period last year. It is expected that payment of the bonus will stimulate both wholesale and retail business. Department stores enjoyed a good volume of trade, and it is predicted that sales for June will surpass those for the corresponding month last year by at least 10 per cent.

Carloading Slightly Lower

Railway freight loadings during the week ended May 30 totaled 646,859 cars, which marks a decline of 36,547 cars below those in the preceding week, a gain of 84,177 cars above those a year ago, and an increase of 67,203 cars above those two years ago.

Farm Income Highest Since 1930

Farm income from the beginning of this year up to May 25 was larger than in any similar period since 1930, and further gains are in prospect. During the first four months of this year, the total was $2,079,000,000, of which only $62,000,000 was made up of rental and benefit payments. Farm income in the corresponding period last year amounted to $1,970,000,000, including $221,000,000 in government payments.

Power Output Steady

Production of electricity by the electric light and power industry in the United States during the week ended May 30 was somewhat below that in the preceding week but was 18 per cent above that in the corresponding period.

Farm Prices Decline

According to the Bureau of Agricultural Economics, the farm price index on May 15 stood at 103, as against 105 a month earlier and 108 a year ago. The current decline is chiefly due to lower prices for wheat, hogs, cattle, and dairy products. The index of prices paid by farmers remained unchanged.

Fisher's Index

Professor Fisher's index of wholesale commodity prices for the week ended June 6 stood at 81.2, the same as the week before, as compared with 80.5 two weeks before.

The consolidated statement of the Federal Reserve banks for the week ended June 3 showed an increase of $1,000,000 in holdings of discounted bills and a decline by the same amount in holdings of bills bought in the open market. Holdings of government securities remained unchanged. Money in circulation increased $51,000,000, and monetary gold stocks rose $21,000,000.

May Sales Down Only 2%

(*Continued from page* 821)

introductions will be concentrated in the latter part of October and early November.

The manufacturing program of one of the volume producers calls for a 22 per cent drop in production from June to July and a further cut of 31 per cent in August, which will complete the run on present models. A few companies are slated to wind up in September.

A closer estimate on May production indicates the industry turned out approximately 485,000 cars and trucks last month, which compares with 527,726 units in April and 381,809 in May last year. It brought the total for the first five months this year to 2,129,000 vehicles, comparing with 1,957,636 in the corresponding period of 1935.

Retail deliveries of the Buick Motor Co. during May totaled 17,689 units, the best for the month since 1929. This compares with 18,784 units delivered in April, and with 7468 in May a year ago.

May retail deliveries of Chevrolets totaled 129,816 units and were the greatest May sales in the company's history. This compares with the 133,578 cars and trucks delivered in April, which established an all-time high for any month. Total sales for the past three months amounted to 389,556 units, which set the additional record, according to company reports, of being the largest sales for any 90-day period.

Retail sales of Hudsons and Terraplanes reached approximately 14,000 units in May, as compared with 10,658 in the same month of 1935.

Mack Trucks, Inc., reports orders for buses, booked during May, total $1,750,000 and that orders amounting to $1,500,000 have been received during the past four months for the new Mack junior line.

Both retail sales and production records are being set at Oldsmobile. Sales during the last 10 days of May totaled 9407—largest in the company's history for any 10-day period. Sales for the first five months of 89,019 cars represent a gain of 27 per cent over the same period last year. May production was 23 per cent ahead of 1935, and on May 28 a one-day record was created when 1121 cars came off the line.

Pontiac deliveries for May totaled 21,278 cars, compared with 19,481 in April and 16,209 in May, 1935. This is the largest May sales figure since 1929.

Domestic retail deliveries of Studebaker cars and trucks totaled 8440 in May, highest sales in any of the past 81 months. Total sales this year for the first five months equal 40,008 units, compared with 25,812 units last year.

Twin Coach Co. reports orders for 34 new buses for the Birmingham Electric Co. The order amounts to approximately $250,000.

AMA Supplies 400 Cities With Textbooks on Traffic

To fill a rapidly growing demand for study courses in police traffic schools and traffic court violators' schools, the automotive industry this week supplied 400 cities with illustrated textbooks containing a detailed course of study. The course was originally developed at the request of Detroit police and court officials, by the Detroit Safety Traffic Sub-Committee of the Automobile Manufacturers Association, with the collaboration of Ralph L. Lee of the General Motors Corporation, and a member of the committee.

40 Years Ago

—with the ancestors of AUTOMOTIVE INDUSTRIES

The track vehicle should be banished from the busiest thoroughfares altogether. It has no right to be there. It is built primarily for speed and for the handling of large loads, but the congested condition of the main streets in cities renders high speed impossible, and the same conditions prohibit the running of cars or trains of sufficient capacity to accommodate the public.

For ordinary local passenger work the motor bus, built almost as large as the street car, will prove much more satisfactory.

—From *The Horseless Age*, June, 1896.

Tourist Trailer Forerunner

R. L. MARTIN, Weir Park, Florida, wants a motor car for ordinary roads, with cooking and sleeping accommodations for eight people. Designs, etc., will reach him addressed as above.

—Advertisement from *The Horseless Age*, June, 1896.

Japan's Motor Law

Act Puts Drastic Restrictions On Foreign Manufacturers

Special to AUTOMOTIVE INDUSTRIES

Japan's Automotive Industrial Control Act, which places drastic restrictions on the manufacture of foreign automobiles in Japan, is reported to have become a law.

Most important of its provisions is that all foreign producers must be sanctioned by the government, and in order to meet the qualifications a majority of the voting stock must be held by Japanese interests. The law further specifies that the government shall have the right to issue such orders to the licensed companies as may be advisable for national defense measures, that the government may require the altering of price schedules, and that it may take such steps as are necessary to prevent the importing of foreign cars.

Another feature of the law will bring about the merger of several small Japanese automotive concerns, many of which now run on a machine-shop basis, in order that the Japanese automotive industry may become self-sufficient.

The effect of the bill upon General Motors and Ford, the two largest foreign producers, is not yet known. It is reported that General Motors is inclined to sell its interest but that negotiations with Nissan Jidosha, manufacturer of the "Datsun," have failed. Ford, on the contrary, issued a statement in Tokyo that the company will attend to its own affairs "under any circumstances whatsoever."

H. L. BREITENSTEIN has been appointed district manager of a new Detroit office of the All-Steel-Equip Co. of Aurora, Ill.

C. E. SIMS, formerly assistant director of research for the American Steel Foundries, Indiana Harbor, Ind., has been appointed research metallurgist at Battelle Memorial Institute, Columbus, O. Mr. Sims will direct several new research projects which have recently been initiated at Battelle.

PAUL F. BROPHY has been appointed general sales manager of the new trailer division of the Mullins Manufacturing Co.

French Automobiles "Tax Engineered"

(*Continued from page* 821)

that is, if we could get a wider acceptance of the fact that we cannot stop at any one point of technical progress, we would be able to do much for the hastening of the technical renaissance which I have no doubt will grow out of the automotive industry and which I firmly believe lies in the immediate future not only for the U. S., but for the entire civilized world."

The Republic of France recently elevated M. Goudard to the grade of commander of the Legion of Honor in recognition of his services to his country. M. Goudard is president of the Solex Carburetor Co. which he founded in 1907.

Enroute around the world and coming to this country after an extended stay in Japan, M. Goudard will spend a month in the U. S., to get a closer impression of late developments here and to exchange views on European automotive aspects before returning to France.

GM's Share Now 45%

Four Months Passenger Car Registrations 23% Above Last Year; Trucks Up 28%

New Passenger Car Registrations*

	April 1936	March 1936	April 1935	Four Months 1936	Four Months 1935	Per Cent Change, 4 Mos. 1936 over 1935	Numerical Change, 4 Mos. 1936 over 1935	Per Cent of Total Four Months 1936	Per Cent of Total Four Months 1935
Chevrolet	110,481	86,504	74,012	313,311	185,164	+ 69.2	128,147	29.02	21.06
Ford	85,085	68,428	103,903	247,981	309,030	— 19.8	—61,049	22.97	35.15
Plymouth	54,597	40,494	41,876	148,590	127,797	+ 16.3	20,793	13.76	14.53
Dodge	27,893	20,853	19,913	75,091	57,489	+ 30.6	17,602	6.95	6.54
Oldsmobile	24,267	17,328	17,345	62,510	45,553	+ 37.2	16,957	5.79	5.18
Pontiac	19,683	14,235	15,720	51,143	43,552	+ 17.4	7,591	4.74	4.95
Buick	18,514	12,814	6,758	47,148	19,915	+136.7	27,233	4.38	2.26
Terraplane	9,744	6,255	6,043	24,387	16,836	+ 44.9	7,551	2.26	1.92
Studebaker	7,599	5,608	4,406	20,349	12,440	+ 63.6	7,909	1.88	1.41
Chrysler	6,557	4,946	5,128	17,954	13,922	+ 29.0	4,032	1.66	1.58
Packard	6,487	4,604	3,137	16,545	4,823	+243.0	11,722	1.53	.55
De Soto	4,193	3,202	3,022	11,483	8,272	+ 38.8	3,211	1.06	.94
Hudson	2,736	1,877	2,493	7,601	6,884	+ 10.4	717	.70	.78
Nash	2,646	1,909	1,701	6,992	4,521	+ 54.7	2,471	.65	.51
La Fayette	2,258	1,652	1,860	5,907	4,718	+ 25.2	1,189	.55	.54
Graham	1,600	1,264	1,814	4,554	4,588	— .8	— 34	.42	.52
Lincoln	1,377	1,010	185	3,887	548	+609.3	3,339	.36	.06
Cadillac	1,271	985	526	3,749	1,560	+141.3	2,189	.35	.18
La Salle	1,414	1,013	1,344	3,709	2,609	+ 42.2	1,100	.34	.30
Willys	982	793	945	3,263	2,822	+ 15.6	441	.30	.32
Reo	419	315	404	1,132	1,136	— .4	— 4	.10	.13
Hupmobile	193	284	912	1,013	2,666	— 62.0	— 1,653	.09	.31
Auburn	263	180	538	819	1,913	— 55.2	— 1,094	.08	.22
Pierce-Arrow	99	72	72	275	218	+ 26.1	57	.03	.02
Cord	143	81	.....	231	.....	.....	231	.02	.....
Miscellaneous	87	16	62	136	314	— 56.7	— 178	.01	.04
Total	390,588	296,722	314,119	1,079,760	879,290	+ 22.8	200,470	100.00	100.00
Chrysler Corp.	93,240	97,429	69,939	253,118	207,480	+ 22.0	45,638	23.44	23.60
Ford and Lincoln	86,462	41,504	104,088	251,868	309,578	— 18.6	— 57,710	23.33	35.21
General Motors	175,630	132,879	115,705	481,570	298,353	+ 61.4	183,217	44.60	33.93
All Others	35,256	24,910	24,387	93,204	63,879	+ 45.9	29,325	8.63	7.26

New Truck Registrations*

	April 1936	March 1936	April 1935	Four Months 1936	Four Months 1935	Per Cent Change, 4 Mos. 1936 over 1935	Numerical Change, 4 Mos. 1936 over 1935	Per Cent of Total Four Months 1936	Per Cent of Total Four Months 1935
Chevrolet	23,097	19,332	14,832	72,531	50,007	+ 45.1	22,524	36.23	31.93
Ford	18,325	15,969	17,709	61,126	61,902	— 1.3	— 776	30.54	39.52
Dodge	8,727	6,669	5,605	27,159	18,233	+ 49.0	8,926	13.57	11.64
International	7,246	5,314	4,451	21,668	14,758	+ 46.8	6,910	10.82	9.42
G. M. C.	2,700	1,533	846	5,419	3,101	+ 74.8	2,318	2.71	1.98
Diamond T	775	627	557	2,407	2,134	+ 12.8	273	1.20	1.36
White	552	348	274	1,602	997	+ 60.7	605	.80	.64
Reo	374	256	433	1,186	1,482	— 20.0	— 296	.59	.95
Plymouth	281	231	18	893	34	.....	859	.45	.02
Federal	266	199	172	858	567	+ 51.3	291	.43	.36
Studebaker	322	221	184	820	553	+ 48.3	267	.41	.35
Willys-Overland	204	142	150	666	364	+ 83.0	302	.33	.23
Mack	285	177	154	659	428	+ 54.0	231	.33	.27
Terraplane	217	139	89	509	167	+204.8	342	.25	.11
Brockway	174	121	109	477	315	+ 51.4	162	.24	.20
Indiana	134	118	24	451	78	+478.2	373	.23	.05
Autocar	116	87	79	335	246	+ 36.2	89	.17	.16
Stewart	109	73	60	329	196	+ 67.9	133	.16	.13
Divco	161	61	13	308	57	+440.4	251	.15	.04
F. W. D.	31	48	14	135	74	+ 82.4	61	.07	.05
Twin Coach	12	8	14	59	31	+ 90.3	28	.03	.02
Sterling	21	17	31	50	65	— 23.1	— 15	.02	.04
Miscellaneous	175	127	248	535	827	— 35.3	— 292	.27	.53
Total	64,304	51,817	46,066	200,182	156,616	+ 27.8	43,566	100.00	100.00

* All data complete with the exception of Connecticut.

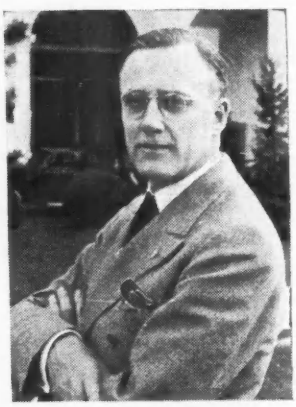
SAE—Summer Meeting—

A rotunda group in front of the Greenbrier. Recognized: Col. J. G. Vincent, Packard (at left) talking to John Warren Watson of J.W.W., Inc. At right: W. J. Davidson, General Motors

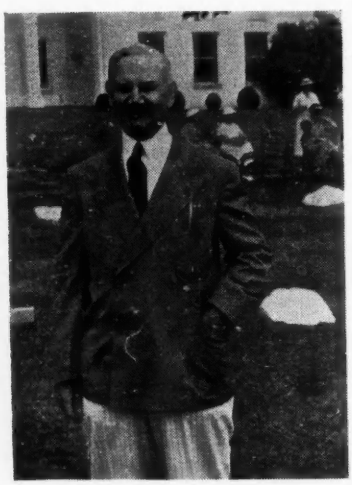
Dr. B. J. Lemon

Paul G. Hoffman

Ben Hopkins



Laurence P. Saunders



Alfred Reeves

Harold Nutt

W. S. James

B. B. Bachman

K. T. Keller

William B. Stout

Candid Camera

R. F. Norris

Here is a view around the finish line at the safety-driving contest

Macy Teetor

Dr. J. C. Geniesse

J. B. Macauley

Herbert L. Sharlock

George A. Round

Louis Schwitzer

Robert N. Janeway

S. W. Sparrow

Karl M. Wise

New Type Concealed Door Hinge Perfected by Ackerman-Blaesser

After many years of development Ackerman-Blaesser-Fezzey, Inc., Detroit, Mich., has perfected a concealed hinge of simple construction which may be applied with facility to any production autobody. The hinge is made of two drop-forged pieces and is quite comparable in cost to any high-grade forged hinge.

The hinge is recessed within the pillar and is fastened in conventional fashion. It is claimed that door hanging is not affected in any way and that the doors may be adjusted by conventional means, and a door opening of 70 degrees is permitted.

A Lincoln Zephyr fitted with a set of A-B-F hinges and with flush-type door handles was shown at White Sulphur Springs during the recent S.A.E. Summer Meeting.

New Bantam Line to Come From Old Austin Factory

Officials of the Bantam Car Co., Butler, Pa., owner of the defunct American Austin Car Co., have announced reorganization and plans for the production of improved models of the "Bantam" to include a small commercial truck and a line of two-passenger cars.

Roy S. Evans, formerly of Atlanta, Ga., is president of the company, and has been in Butler since the purchase made at a trustee's sale last August. Harry A. Miller, famed for his racing motors, is vice-president in charge of engineering. Vice-president in charge of body engineering is Thomas L. Hibbard, formerly of Hibbard and Darrin, custom body builders in Paris, and of General Motors. Peter Beasley of the Detroit Aircraft Corp. is secretary of the company and Martin Tow is treasurer.

Mr. Evans has announced that production will start within 90 days and that the company will have a capacity of 5000 cars a year. The price range will be from $295 to $345 F.O.B. the factory.

Officials have stated that an issue of convertible preference stock has been underwritten by Dingwall & Co., and Tooker & Co., of New York. The Bantam company has authority to issue 100,000 shares of $10 par convertible stock and 600,000 shares of no par common.

Reynolds Spring Dividend

Reynolds Spring Co., Jackson, Mich., has declared a dividend of 100 per cent on the common stock, payable June 29 to holders of record June 15. In addition the board ordered a regular 25-cent dividend payable on the same date.

Automotive Metal Markets

New Sheet Steel Business Is at Third Quarter Prices; Alloy Bar Demand Continues Firm

By William Crawford Hirsch

Business being booked from now on by producers of finished automobile sheets is presumed to carry full third-quarter prices, there not being sufficient time left to complete shipments at old prices within the allotted period. A certain amount of routine covering of this type, to provide material needed for July assemblies, is reported. Otherwise, anticipatory buying is largely in semi-finished steel, considerable tonnages of which are being stocked by non-integrated rolling and finishing mills.

In hot-rolled strip steel, booking of orders at the $2 per ton advance for third quarter is so far of light proportions. Cold-rolled strip has not been affected by the general advance, due to the unwillingness of producers again to be pitted against the competition of sheets. When it is more advantageous to slit these, many automotive consumers switch promptly from the narrower to the wider class of flat steel.

Buying of cold finished alloy steel bars is well maintained. There has been a $2 advance in these, while ordinary carbon steel bars have been raised $3 per ton. Aside from this, however, cold-finishers of steel bars are accepting specifications at old prices throughout June, shipments to be completed before the end of July, this procedure being an established custom in the cold-finishing department of the industry.

It has recently been pointed out by statisticians that production of cold-finished alloy bars has more than doubled in the last three years and is now probably four times what it was five years ago. Aside from the general betterment in steel consumption, this is taken to indicate a definite trend toward the use of more and more cold-finished alloy steel bars by the automotive industries. To complete the upward revision of prices, those for rivets have been advanced by from 5 to 8 per cent, effective July 1.

Pig Iron—Blast furnace sales representatives, seeking instructions from their principals on third-quarter prices, have been told to continue booking business for the time being at current prices. In one of the Middle West markets a round lot in an idle furnace yard is reported to have been sold at $1 per ton concession from the going price. Quotations generally rule firm and unchanged.

Aluminum—Both primary and secondary metal and alloys are unchanged in price and the market rules steady.

Copper—Rumors that copper producers are considering a curtailment of their output, so as to hasten a better balance of supply and demand, are offset by agitation abroad that quotas should be raised, to enable producers to increase production in step with growing world consumption. While it is thought that stocks have increased at a more rapid rate of late than they did last year, the present lull in both domestic and foreign buying is considered temporary. The price remains at 9½ cents, delivered Connecticut, with the "outside" market 9.30 cents.

Tin—Following sharp ups and downs, Straits tin for spot delivery was offered on Monday at 43 cents, with consumers apathetic.

Lead—Quiet and unchanged.

Zinc—Steady and unchanged.

Calendar of Coming Events

SHOWS

Olympia Motor Show, London, England, Oct. 15-24
National Motor Truck Show (N. J. Motor Truck Assn.), Newark, N. J., Nov. 3-7
National Automobile Show, Grand Central Palace, New York.....Nov. 11-18
International Aviation Show, Paris, France .....Nov. 13-29
Boston Automobile Show.....Nov. 14-21
Columbus Automobile Show ....Nov. 14-20
Chicago Automobile Show.....Nov. 14-21
Detroit Automobile Show.....Nov. 14-21
Washington, D. C., Automobile Show, Nov. 14-21
Cincinnati Automobile Show....Nov. 15-21
St. Louis Automobile Show.....Nov. 15-22
Baltimore Automobile Show....Nov. 21-28
Brooklyn Automobile Show.....Nov. 21-28*
Cleveland Automobile Show.....Nov. 21-28
Kansas City Automobile Show..Nov. 21-29*
Milwaukee Automobile Show....Nov. 22-29
Peoria Automobile Show...Nov. 30-Dec. 5*
Philadelphia Automobile Show, Nov. 30-Dec. 5*

* Tentative dates.

Natl. Exposition of Power & Mechanical Engineering, Biennial Meeting, New York City .....Nov. 30-Dec. 5
Automotive Service Industries Joint Show, Chicago .....Dec. 9-14

CONVENTIONS AND MEETINGS

National Oil and Gas Power Conference, American Society of Mechanical Engineers, University of Michigan, Ann Arbor .....June 24-27
American Society for Testing Materials, Annual Meeting, Atlantic City .....June 29-July 3
National Association Power Engineers, Annual Meeting, Chicago, Aug. 31-Sept. 4
American Transit Association, Convention, White Sulphur Springs, W. Va. .....Sept. 21-24
First Aircraft Production Meeting of the S. A. E., Los Angeles....Oct. 14-16
American Society for Metals, 18th Nat'l Congress, Cleveland, O. ....Oct. 19-23
American Gas Association, Annual Meeting, Atlantic City.....Oct. 26-31
American Petroleum Institute, Annual Meeting, Chicago .....Nov. 9-12
Natl. Industrial Traffic League, Annual Meeting, New York City.....Nov. 19-20

Just Among Ourselves

Are We People Or Gasteropods

THE tourist-trailer industry is buzzing like an agitated bee. This isn't news, of course, one reason being that the general magazine field has been quick to sense the opportunity for human interest presentation of material connected with the use of trailers.

It's an election year — bandwagons seem popular — and we are on the trailer bandwagon this week with what we hope is a real contribution to systematizing the immense amount of material available on the engineering and possibilities of the tourist-trailer industry. Please finish reading this page and then turn to page 830, where Philip H. Smith tells about the importance of the trailer industry to date, and what can be expected of it in the near future. There's even a specifications table of some representative trailers, and we intend to bring that up to date from time to time. But we warn you that any such table will be slightly outmoded the day after it's published—that's how fast new manufacturers are coming into the trailer field.

Mobility Leads And Will Keep On

MANY sociologists feel, as we have pointed out before, that the American people are ready for an extension of their mobility, and that the "home on wheels" will probably be an important factor in promoting this mobility. It has been questioned whether trailers are not merely a passing fad, but, given the underlying social urge for mobility, fed and stimulated for years by a high density of motor vehicle ownership, it seems to us that the trailer rush is likely to last until some other fundamental social cycle replaces the urge for mobility—or at least until the mobility cycle passes its earthbound stage.

So we have the trailer with us in rapidly increasing number, and, no matter what your personal reaction may be to the idea of becoming a sort of terrestrial Gasteropod, and snail-like, dragging your house wherever you go, there are certain considerations involved which deserve—perhaps they are getting—the serious attention of many kinds of manufacturers in the automotive industry.

How About Matched Sets?

IT seems to us, for instance, that passenger-car manufacturers could get further in making and selling trailers than the average trailer manufacturer. Many trailers leave much to be desired in appearance when they are placed alongside a 1936 passenger car, and the obvious answer is a "matched set"—trailer designed to harmonize in external appearance with the passenger car which pulls it.

Car and trailer could be sold and financed together, too, and the service problem would be simplified if some parts of the running gear of the trailer were interchangeable with those on the car which was its prime mover.

From the standpoint of safety it would be better if cars and trailers were engineered together, in consideration of such points as relative centers of gravity, drawbar connections, turning radius of the train, etc.

State legislatures, with their genius for writing answers in the statute books to engineering questions, will get busy not later than next January. Some automobile manufacturers could have the answers by New York Show time.

Convention Keynote Has Automotive Sound

TO the automobile industry belongs the honor of being the only industry mentioned specifically in Senator Frederick Steiwer's Republican keynote speech of June 9. He pointed out how the American system, as administered between 1910 and 1929, had brought increased average annual wages to workers in industry and agriculture, so that "in 1910 it took a year's work to buy an automobile, but it 1929 it took only half a year's work."

"In consequence," said Senator Steiwer, "where in 1910 we had less than half a million passenger cars, in 1929 we had more than 23 million."

Politely passing over the Senator's disregard of how the automobile industry, through mass-production economies contributed to making possible purchase of an automobile with a half-year's work, there is still a lot of material for reflection in his contention.

Service Trades Mentioned, Too

AUTOMOTIVE analogy cropped up again when the Senator referred to unemployment. His thesis was "if the workers and owners in agriculture and in industry can mutually exchange man hours of labor on a proper level, their capacity to consume is boundless. The servicing of their wants brings into profitable employment the great army who do not produce goods but who produce services, and who are as necessary as those who produce goods."

To which his tag was "automobiles would not be of much use without gas stations."

—H. H.

Trailers to the Front-

By Philip H. Smith

PUTTING a house on wheels is a sure fire way to make it sell. This is virtually what the tourist trailer industry has been doing. And watch it grow!

This new industry is unmistakably a chip off the old block, not alone because it tags on behind, but because it is growing up in the pattern of the automobile industry with all its good and bad features. Nurtured largely on red ink during the depression and accustoming itself to limited fare, it has shown a vitality that is truly astounding and promises to fatten through 1936.

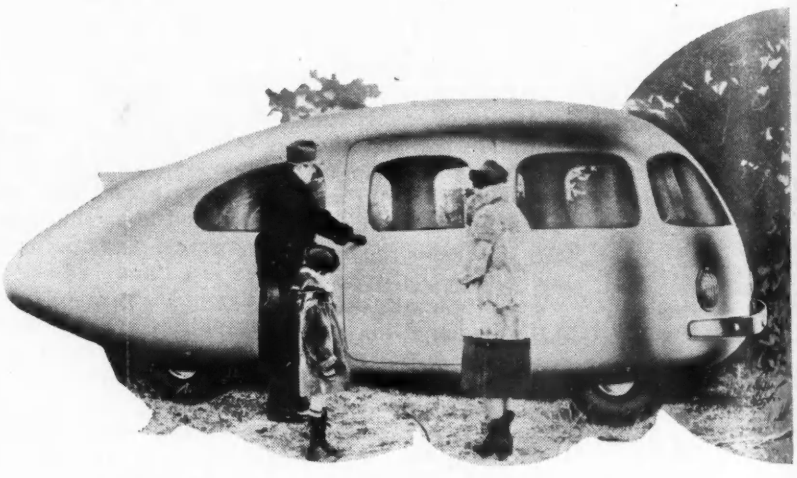
Thirty-five years ago a few strong companies and hundreds of one-man organizations sweated behind closed doors to bring forth original automotive ideas into material form. This describes the trailer industry today. There are between 250 and 300 manufacturers scattered from coast to coast with the center already definitely in and around Detroit. A generous 10 per cent are full-fledged producers, perhaps 50 per cent are "blacksmiths," as the trade likes to call them, and the remainder produce trailers as adjuncts to other lines, often as a strictly custom proposition.

Largest among producers is the Covered Wagon Co. and to give a listing of a few of the most prominent—Curtiss Aerocar Co., Gilkie Trailers Corp., Kozy Coach Co., Roycraft Coach Co., Raymond Products Co., Schelm Bros., Inc., Silver Dome, Inc., Split Coach Motor Corp. and Trotwood Trailers.

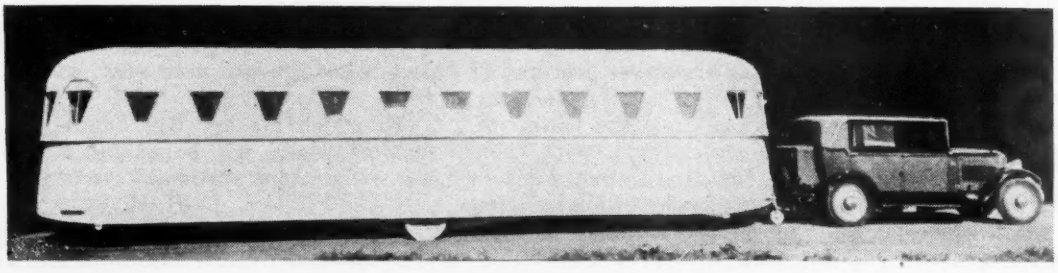
Like the automobile industry of earlier days, capital investment is small and plants may be almost anything. Companies have been growing from their own centers, by plowing back profits, but that period is passing. Production is growing too fast and a call on outside capital is beginning to be made. Last year output was approximately 15,000, exclusive of the open-cart type of trailer. Adding this last type would raise the total to about 25,000. This year output of the tourist type will reach 30,000 or more because production programs have been doubled quite generally and in some instances they have been trebled and quadrupled. Such large-scale manufacture creates a need for modernized plants and machines, and, above all, working capital.

Body builders and ex-body builders dominate the industry, not automotive men. With few exceptions, today's producer is a man trained in wood joining, cabinet making and the art of the wheelright. Not a few got their start from building the family trailer, then making a better one for a neighbor, and from that stepping to manufacture. Among the 10 leading producers two began from such simple beginnings about six years ago. Business is still very much localized, few companies approaching anything that can be termed national in scope of their operations. But quality may be found anywhere and does not necessarily correlate with plant size, location or annual output.

Sales have been made by word-of-mouth—the virulent infection spread

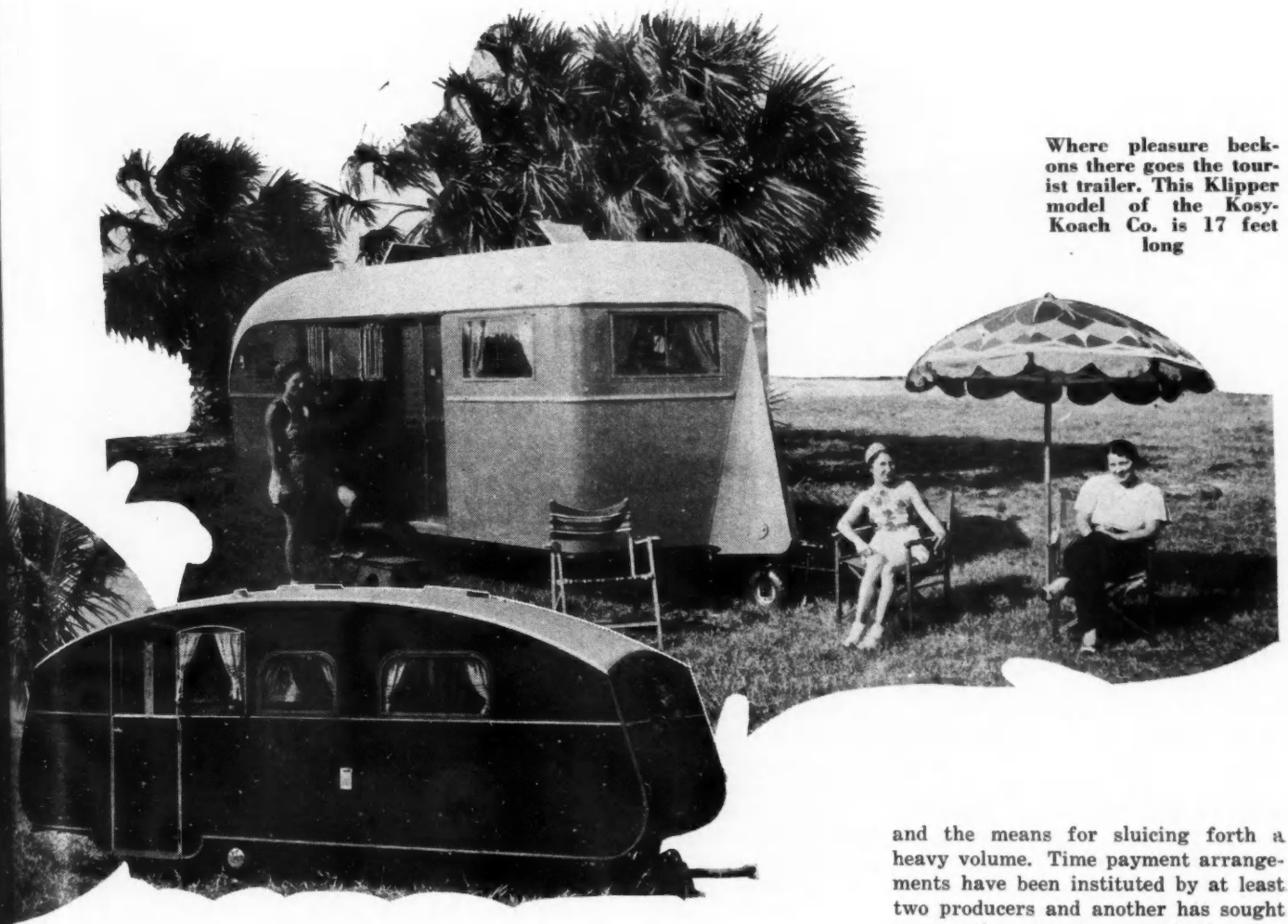


The Saginaw Stamping & Tool Co., make the "Pribl" Mobile Home although not a trailer is equipped similarly to the tourist type shown elsewhere in this article



The Trailer Train Home is a unit 30 feet in length and seven feet wide. It is divided into four rooms and balanced on two wheels in the center with a safety wheel on either end

with a production of 25,000 last year from 250 to 300 producers. Tourist type is the biggest seller. Output of this type alone is expected to exceed 30,000 in 1936



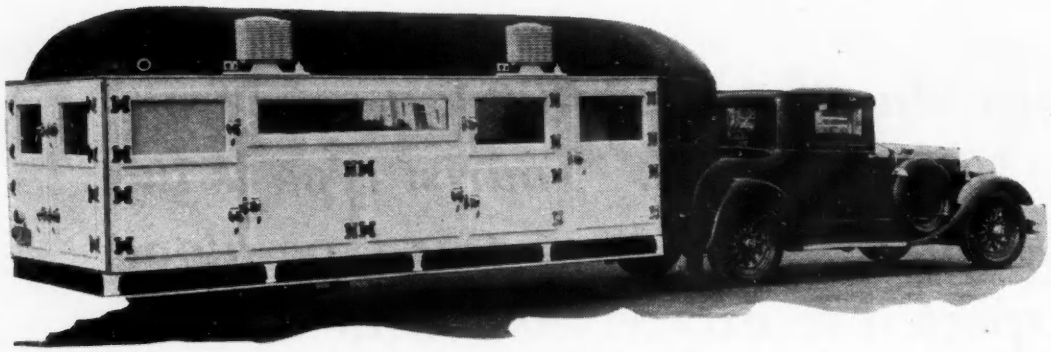
Where pleasure beckons there goes the tourist trailer. This Klipper model of the Kosy-Koach Co. is 17 feet long

The York Cruiser Model is the product of the Split Coach Motor Corp.

by owners—and by some direct mail attacks. Advertising has played little part up to now, but here again the infant era is passing as any reader of magazine copy can note. From-factory-to-you has been the unplanned plan of distribution. No more was necessary. You wrote a letter and got a circular. You motored to Detroit, say, and had the trailer hitched behind, and laid your money down, or maybe you paid 25 per cent down and had the trailer shipped, balance on delivery.

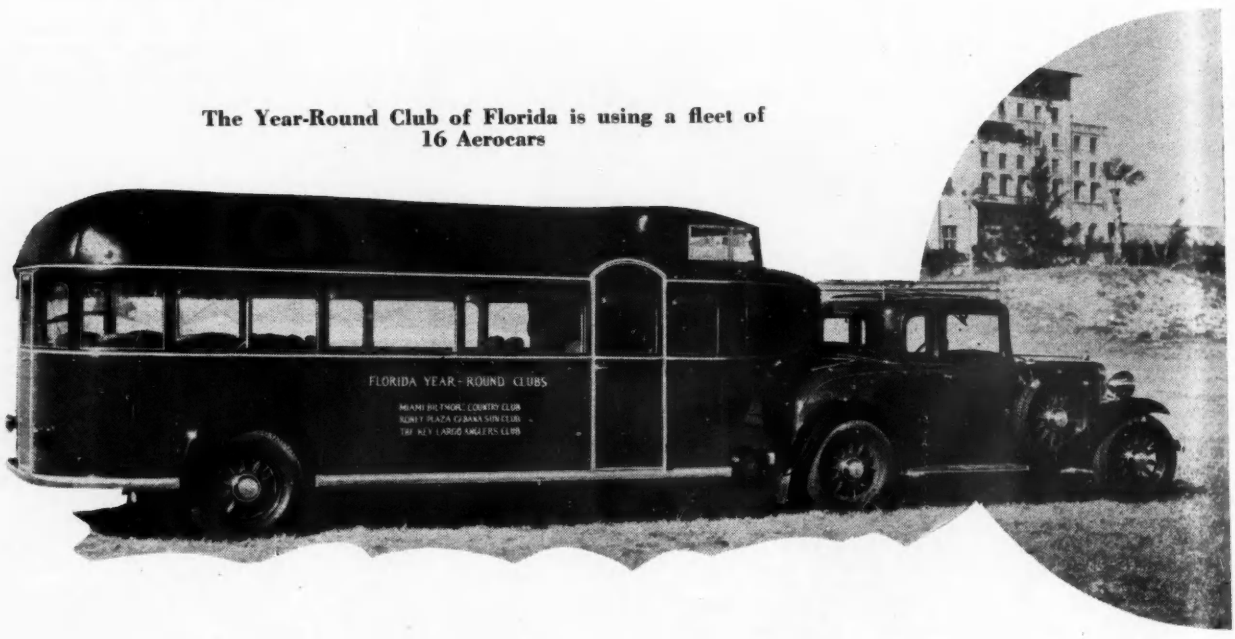
All this is changing rapidly under the exigencies of satisfying demand and developing more. Dealers are being appointed; car dealers in particular are being solicited in order to widen distribution because they seem to be the logical contact with the public and the means for sluicing forth a heavy volume. Time payment arrangements have been instituted by at least two producers and another has sought to ease the way of ownership for metropolitan buyers by arranging for special garaging rates. Nationally circulated magazines are beginning to carry sizable ads and with this widening of individual company horizons there is being made an effort to establish showrooms where prospects can see the real thing and save the travel which was formerly necessary if a local product was voted out.

Since the industry embraces such a wide variety of talent one might expect an equally wide variety of products. But this is not the case. In fundamentals of design there is great sim-



The General Electric Co. is using an Aerocar to display its line of electric refrigerators

The Year-Round Club of Florida is using a fleet of 16 Aerocars

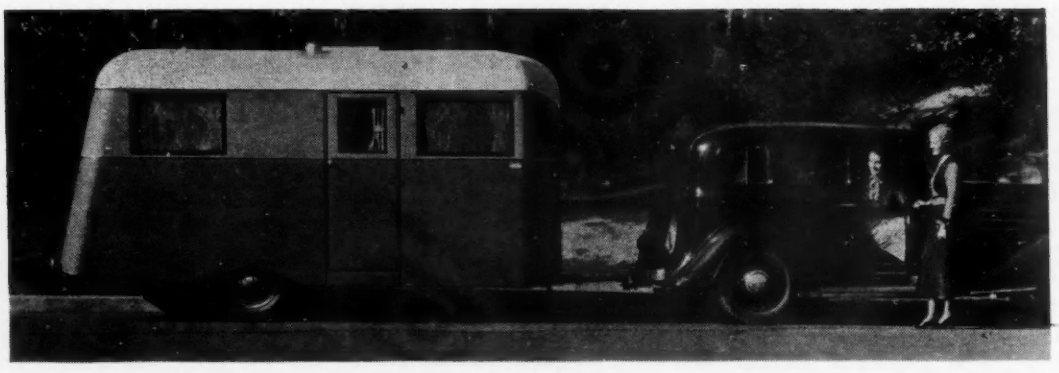


ilarity, variations appearing in minor phases of design, fittings and equipment. And though the size of producing plants varies enormously, the pricing of products is also relatively uniform.

There are two reasons for this. In the first place the common body and carriage building heritage establishes certain standards of materials and design. Mass production technique, as the automobile industry knows it, is approached by only a few companies. Hand work has to predominate when output runs from 10 to 100 trailers a year as it does for the majority. Mass production presupposes a mass output and that's only now beginning for a few companies at the top.

The prominent role played by the outside supplier is a second reason for uniformity. It is possible to buy wheels, axles, springs, couplings and other units from well-established purveyors. And this goes for equipment, too, such as stoves, ice boxes, sinks, etc. Many producers do purchase these units and concentrate their efforts upon design, style and assembly. Is this not reminiscent of automotive history?

One effect created by the outside supplier is to increase the number of producers; another is perhaps to raise the standard of all products. A third effect is to encourage the mechanically inclined homebody, the carpenter out of



The Master model of the Covered Wagon line. This company has just announced a four wheel Home Trailer 22 feet long

work, and the backyard mechanic to build his own. The trailer company often goes for the same market, but limits encouragement to home talent to offering a shell and letting the purchaser supply the fittings and equipment.

The importance of the outside supplier is apt to be overlooked when appraising the trailer industry. He it is who has shortened the period of experimentation by offering units which have been perfected for the automobile, and it is the supplier again who is contributing much of the engineering talent and development work upon which the industry depends for progress.

It is as complex a proposition to give a comprehensive picture of present-day trailer products and the price structure—to describe the trends in design and price movements—as it would be to tackle the story of the "F.O.B. and Delivered Price Maze" in the automobile world. Indeed, it is more difficult, because new models are popping daily and what is true today is perhaps less true tomorrw. "Changes in equipment and appointments follow so rapidly," says one producer, "that what we designed 30 days ago for 1936 is already obsolete, and what we will have to sell in the summer of 1936, will probably be what we would have reached under any normal demand in about 1940." He might have included construction as subject to equally violent change. Yearly models are already a fact, but design and equipment changes appear at more frequent intervals, to be given final test in the hands of owners in the orthodox fashion.

Broadly speaking, manufacture is beginning to focus upon models to sell in the $500 to $700 price range. Producers of high-priced trailers are now bringing out models to sell at this moderate price; specialists in the lowest priced group are reaching up. The extremes meet at this $500-$700 point.

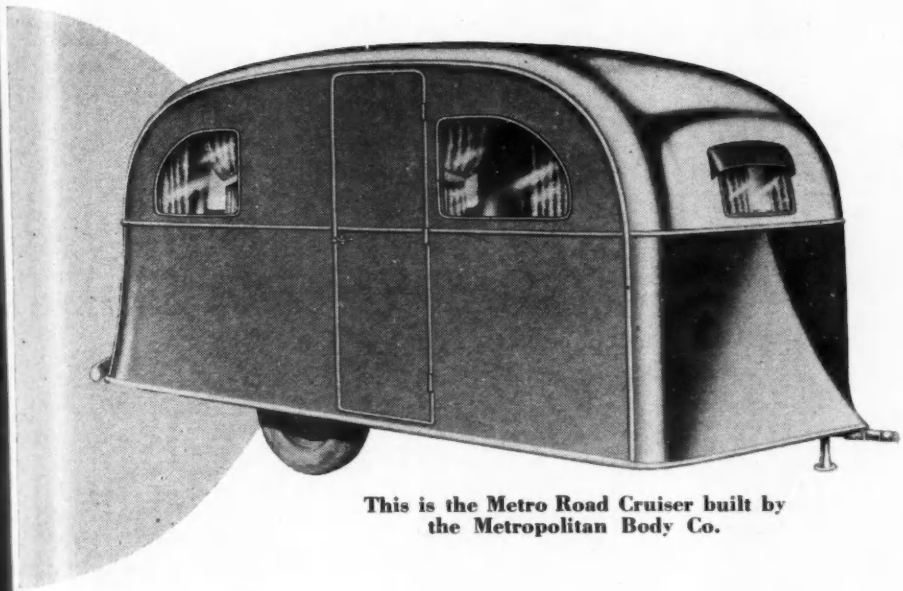
Length has a great deal to do with price, but the correlation is not absolute. There are standard and de luxe models and one man's standard will sell at the price of another's de luxe. Nor is length itself an accurate measure of products, because overall length may not by synonymous with interior size. The use of the word "standard" to designate equipment is already as illusory as it is in the automobile field, but this much can be said: When a model appears to be strikingly underpriced, usually one or more items of essential equipment usually will be found lacking. This tends to substantiate the statement that there is uniformity in offered values.

Whatever the concentration of manufacture upon a medium priced model, practically all manufacturers offer at least three models. The lowest priced model may be a shell, unequipped except for electric wiring, and intended for commercial use—display of manufactured wares—or for outfitting by the purchaser; or it may be small in length and adequately equipped. On the other end of the price range there may be a large model, frequently dolled-up as a de luxe product, featuring a few items of distinction.

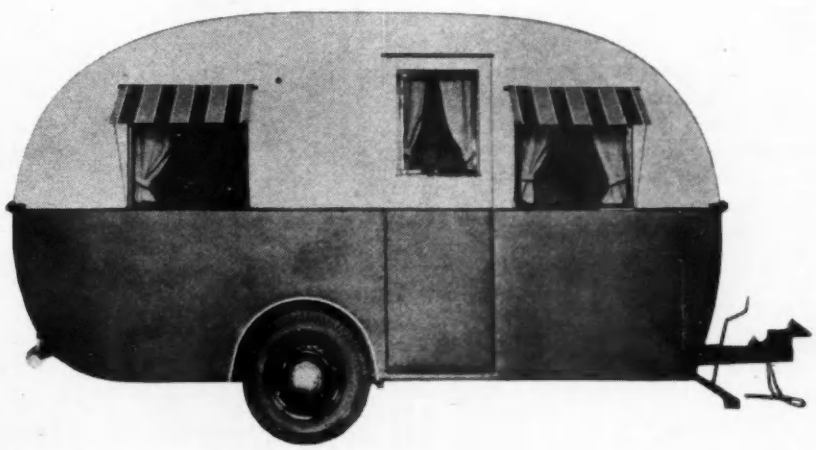
Lowest in price at this writing is a 10-ft. unlined shell offered by Standard Trailer at $189. Close to this comes Sears Roebuck's Trav-L-Home, a cart type trailer when in motion, but expanding to make a full size, fully-equipped trailer when camp is established. This trailer sells for $235 complete, or for $199.50 for body alone, and is frankly advertised as using a factory rebuilt Chevrolet axle and wheels. From these lows, models advance in size and quality to touch the $4,000 mark.

A composite of specifications gleaned from averages tells the most about today's trailer and its construction:

Price: $500-$700
Accommodations: 2 or 4
Weight: 1800 lb.
Weight on drawbar: 200 lb.
Length: 13 to 16 ft.
Width: 6 ft. 6 in.
Height: 6 ft. 2 in.



This is the Metro Road Cruiser built by the Metropolitan Body Co.



Evidently reaching for a design of distinction the Trotwood Trailers, Inc., have presented their Ranger model

Specifications of American Tourist Trailers

MAKE	Model	Accommodations	PRICES: Shell	PRICES: Equipment	PRICES: Total	Weight: Total	Weight: Draw Bar	DIMENSIONS: Length	DIMENSIONS: Width	DIMENSIONS: Height	CHASSIS: Construction	Springs: Type	Springs: No. of Leaves	Springs: Width	Axle: Make	Axle: Type	Axle: Material	Wheels: Type	Wheels: Rim Diam.	Tires	Coupling	Parking	BODY: Side Wall Construction: Exterior	BODY: Side Wall Construction: Interior	BODY: Windows: Number	BODY: Windows: Type	BODY: Screens Type or Material	BODY: No. of Ventilators	BODY: Top Insulation	BODY: Floor: Construction	BODY: Floor: Covering	EQUIPMENT: Number of Beds	EQUIPMENT: Ice Box Capacity	EQUIPMENT: Sink—Material	EQUIPMENT: Water Tank Cap. (Gals.)	EQUIPMENT: Stove—Make or Type	EQUIPMENT: Lighting	EQUIPMENT: Toilet	EQUIPMENT: Shower Bath	EQUIPMENT: Bumper	EQUIPMENT: Brakes	EQUIPMENT: Wired for Radio	EQUIPMENT: Table
Auto Cruiser	Junior	4	$395	$	$545	1790	275	18′ 6″	6′ 6″	6′ 3″	Steel	½E.	10	1¾	Lig.	DCR	CHN.	PS.	16	6.00/16	B&S	JC.	Mas.	Ply.	10	AuP.	Brz.	2	CoPd.	Fir.	Lin.	2d.	50	Chr.	20	Col.	E&I.	O.		Yes.	O.		Y	Y
Auto Cruiser	Senior	5	545		850	1960	360	20′ 6″	6′ 6″	6′ 3″	Steel	Un.	11	1¾	Lig.	DCR	CHN.	PS.	16	6.00/16	B&S	JC.	Mas.	Ply.	13	AuP.	Brz.	2	CoPd.	Fir.	Lin.	2d-1s.	50	Chr.	15	Col.	E&I.	O.	Pfb.	Yes.	O.		Y	Y
Auto-Cruiser	DeLuxe	5	645		1045		385	22′ 6″	6′ 6″	6′ 3″	Steel	Un.	11	1¾	Lig.	DCR	CHN.	PS.	16	6.00/16	B&S	JC.	Mas.	Ply.	13	AuP.	Brz.	2	CoPd.	Fir.		2d-1s.	50	Chr.	15	Col.	E&I.	Y	Pfb.	Yes.	O.		Y	Y
Covered Wagon	Master	2–4	325		395	1600	175	16′	6′ 6″	5′ 2″	O&S	½E.	9	1¾	Lig.	DCR	Moly.	PS.	16	6.00/16	B&S	JC.	L&P.	FPly.	8	THn	Fix.	1	DuAl.	FPly.	Lin.	2d.	50	PoEn	20	E.	E&I.	N	No.	E.	E.		Y	S.
Covered Wagon	De Luxe	2–4	595		785	2100	300	18′ 7″	6′ 6″	5′ 2″	O&S	½E.	11	1¾	Lig.	DCR	Moly.	PS.	16	6.25/16	B&S	JC.	L&P.	MPly.	9	THn	Fix.	1	DuAl.	FPly.	Lin.	2d.	50	PoEn	20	Col.	E&I.	S.	Yes.	S.	E.		Y	S.
Covered Wagon	Custom	2–4	895		1185	2450	175	22′ 0″	6′ 6″	5′ 2″	O&S	½E.	10	1¾	Lig.	DCR	Moly.	PS.	16	6.25/16	B&S	JC.	L&P.	MPly.	11	THn	Fix.	2	DuAl.	FPly.	Lin.	2d.	75	PoEn	30	Col.	E&I.	S.	Yes.	S.	S.		Y	S.
Curtiss Aerocar	161-E	4	2500	1390	3890	3750	930	21′ 9″	6′ 4″	6′ 2″	O&Sp.	½E.	12	2	Lig.	DCR	CHN.	PS.	16	7.00/16	PP.	Tri.	MsL&P	Ms&L	11	AuT.	Roll.	3		Ply.	Az.	4	75	SST.	36	Alc.	E&I.	Y	Yes.	Gr.	Ben.	Y	S.
Curtiss Aerocar	161-B	4	2750	2050	4800	4250	1050	23′ 2″	6′ 4″	6′ 2″	O&Sp.	½E.	12	2	Lig.	DCR	CHN.	PS.	16	7.50/16	PP.	Tri.	MsL&P	Ms&L	11	AuT.	Roll.	4		Ply.	Az.	4	75	SST.	36	Alc.	E&I.	Y	Yes.	Gr.	Ben.	Y	S.
Curtiss Aerocar	162-D	4	2450	1100	3550	3250	850	20′ 6″	6′ 4″	6′ 2″	O&Sp.	½E.	12	2	Lig.	DCR	CHN.	PS.	16	7.00/16	PP.	Tri.	MsL&P	Ms&L	11	AuT.	Roll.	3		Fly.	Az.	4	75	SST.	36	Alc.	E&I.	Y	Yes.	Gr.	Ben.	Y	S.
Curtiss Aerocar	151-D	2	2450	800	3250	3000	800	20′ 6″	6′ 4″	6′ 2″	O&Sp.	½E.	12	2	Lig.	DCR	CHN.	PS.	16	7.00/16	PP.	Tri.	MsL&P	Ms&L	11	AuT.	Roll.	3	Cel.Al.	Ply.	Az.	1	75	SST.	36	Alc.	E&I.	Y	Yes.	Gr.	Ben.	Y	S.
Curtiss Aerocar	100-JC	4						21′ 9″	6′ 4″	6′ 2″	O&Sp.	½E.			Lig.	DCR	CHN.	PS.	16	6.50/16	PP.	Tri.	MsL&P	Ms&L	9	AuT.	Fix.		Mas.	Ply.	Lin.	2	50	SST.		Alc.	E&I.	Y	Yes.	S.	Ben.	Y	S.
Gilkinson	Folding	4			440	1200	50	8′ 0″	5′ 0″	6′ 2″	Steel	Un.	8	2	For.	DCR	FS.	Wire	17		B&S	PL.	M&SS.	Ply.		Pla.	Cop.		C&Ply.	Fir.	Lin.	2d.	40	Al.		S.	E&I.				E.	E.	E
Gilkinson	Skipper	4			585	1900	280	16′ 0″	6′ 4″	6′ 2″	Steel	½E.	9	2	Lig.	DCR	FS.	Wire	16	6.00/16	B&S	Cas.	M&SS.	Ply.	8	Pla.	Cop.	1	C&Ply.	Fir.	Lin.	2d.	50	Al.	15	S.	E&I.			E.	E.	E.	Y
Gilkinson	Standard 16	4			795	2200	325	16′ 0″	6′ 4″	6′ 2″	Steel	½E.	9	2	Lig.	DCR	FS.	PS.	16	6.00/16	B&S	Cas.	M&SS.	Ply.	8	Pla.	Cop.	1		Fir.	Lin.	2d.	75	Al.	15	Col.	E&I.			E.	E.	Y	Y
Gilkinson	Skipper II	4			850	2100	300	17′ 6″	6′ 7″	6′ 2″	Steel	½E.	9	2	Lig.	DCR	FS.	PS.	16	6.00/16	B&S	Cas.	M&SS.	Ply.	8	Pla.	Cop.	2		Fir.	Lin.	2d.	75	Al.	20	Col.	E&I.	Y	E.	E.	E.	Y	Y
Gilkinson	De Luxe	4–8			1250	2450	42.	18′ 6″	6′ 4″	6′ 2″	Steel	½E.	10	2	Lig.	DCR	FS.	PS.	16	6.00/16	B&S	Cas.	M&SS.	Ply.	8	Pla.	Cop.	3		Fir.	Lin.	2–4	75	Al.	20	Col.	E&I.	Y	Yes.	Y.	Y.	Y	Y
Kozy Coach	De Luxe	4			765	2100	325	16 0″	6′ 6″	6′ 0″	W&St.		11		Tim.	DC.	CM.	StS.	16	6.00/16	B&S	JC.	Mas.	Ply.		Cas.	Brz.	2	DuAl.	Fir.	Lin.	2	50	Por.	20	Col.	E&I.	E.	E.	E.	E.	Y	S.
Kozy Coach	Standard	4			575	1900	300	16′ 0″	6′ 6″	6′ 0″	W&St.		9		Tim.	DC.	CM.	StS.	16	6.00/16	B&S	JC.	Mas.	Ply.		Cas.	Brz.	2	DuAl.	Fir.	Lin.	2d.	50	Por.	13	Col.	E&I.	E.	E.	E.	E.	Y	S.
Kozy Coach	Standard	4			675	2350	350	18′ 0″	6′ 6″	6′ 0″	W&St.		9		Tim.	DC.	CM.	StS.	16	6.00/16	B&S	JC.	Mas.	Ply.		Cas.	Brz.	2	DuAl.	Fir.	Lin.	2d.	50	Por.	13	Col.	E&I.	E.	E.	E.	E.	Y	S.
Kozy Coach	Junior	4			520	1750	275	15′ 0″	6′ 6″	6′ 0″	W&St.		9		Tim.	DC.	CM.	StS.	16	6.00/16	B&S	JC.	Mas.	Ply.		Cas.	Brz.	2	DuAl.	Fir.	Lin.	2d.	50	Por.	5	Col.	E&I.	E.	E.	E.	E.	Y	S.
Kozy Coach	Klipper	4			845	2080	300	17′ 0″	6′ 6″	6′ 1″	W&St.		9		Tim.	DC.	CM.	StS.	16	6.00/16	B&S	JC.	Mas.	Ply.		Cas.	Brz.	2	DuAl.	Fir.	Lin.	2d.	50	Por.	17	Col.	E&I.	E.	E.	E.	E.	Y	S.
Metro Road Cruiser		4			635			14′ 6″	6′ 8″		W&St.											J.	M&SS.	Ply.		AuT.	S.	1			Lin.	2d.		S.		E&I.			S.		Y	S.
Oxford	Mainore'te	4						17′ 0″	6′ 6″	6′ 4″	St.														5		Cop.	1			Lin.	2d.	40	Por.	10	S.	E&I.						
Palace Travl Coach	Standard	2–4	395	153	548	1700	250	16′ 0″	6′ 6″	6′ 1″	Steel	½E.	9	1¾	Lig.	DC.	NS.	StS.	16	6.00/16	B&S	JC.	L&Pl.	Ply.	6	Hng.	Cop.	1	Ply-Fab.	Ply.	Lin.	2d.	50	Enl.	10	Col.	E&I.	N	No.	E.	E.	Y	S.
Palace Travl Coach	Std.-De Luxe	2–4	325	105	430	1400	175	16′ 0″	6′ 6″	6′ 1″	Steel	½E.	9	1¾	Lig.	DC.	NS.	StS.	16	6.00/16	B&S	JC.	L&Pl.	MPly.	6	Hng.	Cop.	1	Ply-Fab.	Ply.	Lin.	2d.	50	Enl.	10	Col.	E&I.	N	No.	S.	E.	Y	S.
Palace Travl Coach	Master	6–8	675	220	895	2300	450	16′ 0″	6′ 6″	6′ 1″	Steel	½E.	11	1¾	Lig.	DC.	NS.	StS.	16	6.00/16	B&S	JC.	L&Pl.	MPly.	6	Hng.	Cop.	3	Ply-Fab.	Ply.	Lin.	3d.	50	Enl.	15	Col.	E&I.	Y		S.	E.	Y	S.
Raymond (Travelo)	Standard	2–4	320	135	455	1750	225	16′ 0″	6′ 4″	6′ 2″	Ash	½E.	7	2	Lig.	DC.	CM.	PS.	16	6.00/16	B&S	TC.	L&Pl.	Ply.		Hng.	Cop.	1	Ply,J,Al.	Fir.	Lin.	2d.	S.	S.	20	Col.	E&I.			S.	O.	Y	S.
Raymond (Travelo)	De Luxe	2–4	550	175	725	2250	250	18′ 0″	6′ 4″	6′ 2″	ChSt.	½E.	9	2	Lig.	DC.	CM.	PS.	16	6.00/16	B&S	TC.	L&Pl.	Ply.		Hng.	Cop.	1	Ply,J,Al.	Fir.	Lin.	2d.	S.	S.	22	Col.	E&I.	S.		S.	O.	Y	S.
Silver Dome	Hyway	2			465	1735	245	16′ 0″*	6′ 3″	6′ 2″*	W&St.	½E.	8	2	Own.	DC.		StS.	16	6.00/16	B&S	PL.	Mas.	Ply.	8	THn.	Brz.	1	Ply-Fab.	Ply.	Lin.	2d.	25	Al.	18	E.	E&I.			E.	E.		S.
Silver Dome	De L. Hyway	3			645	1865	285	16′ 0″*	6′ 3″	6′ 2″*	W&St.	½E.	8	2	Own.	DC.	CM.	StS.	16	6.00/16	B&S	PL.	Mas.	Ply.	8	THn.	Brz.	1	Ply-Fab.	Ply.	Lin.	3 pass.	50	Por.	18	S.	E&I.			S.			S.
Silver Dome	Suburban	3			975	2285	335	18′ 6″	6′ 3″	6′ 2″*	W&St.	½E.	9	2	Own.	DC.	CM.	Wire	16	6.25/16	B&S	PL.	Mas.	Ply.	9	THn.	Brz.	1	Ply-Fab.	Ply.	Lin.	3 pass.	75	Por.	20	S.	E&I.	S.		S.			S.
Silver Dome	Country Club	3			1265	2385	295	18′ 6″	6′ 4″	6′ 2″	W&St.	½E.	9	2	Own.		CM.	Wire	17	6.00/17	B&S	PL.	Mas.	Ply.	7		Brz.	1	Ply-Fab.	Ply.	Lin.	2d.	75	Por.	20	S.	E&I.	S.		S.	Ben.		S.
Split Coach	Cruiser Sr.	4–7	650	225	875	2300	350	16′ 9″	6′ 4″	6′ 3″	O&S.	Un.	9	2¼	Lig.	DC.	CM.	PS.	16	7.00/16	B&S	JC.	L&Pl.	Ply.	7	Hng.	Cop.	3	Ply,J,F.	Ply.	Lin.	1d2s.	50	Al.	20	Gas.	E&I.	E.	E.	S.	E.	S.	S.
Split Coach	Cruiser Jr.	2–4	475	160	635	1700	250	12′ 9″	6′ 4″	6′ 2″	O&S.	Un.	7	2¼	Lig.	DC.	CM.	PS.	16	6.00/16	B&S	JC.	L&Pl.	Ply.	6	Hng.	Cop.	2	Ply,J,F.	Ply.	Lin.	1d.	50	Al.	15	Gas.	E&I.	E.	E.	S.	E.	S.	S.
Split Coach	Rambler	2–5	450	90	540	2250	350	14′ 6″	6′ 4″	6′ ½″	O&S.	Un.	9	2¼	Lig.	DC.	CM.	PS.	16	7.00/16	B&S	PL.	L&Pl.	Ply.	7	Hng.	Cop.	2	Ply,J,F.	Ply.	Lin.	1d.	50	Al.	11	Gas.	E&I.	E.	E.	E.	E.	S.	S.
Standard				189			900	125	10′ 0″	6′ 6″	6′ 1″	W&St.	Un.	6	1¾	Tim.	DC.	FS.	Wire	17	5.25/17	B&S	PL.	Mas.	Ply.	6	Hng.	E.		DuAl.	Fir.	E.	E.		E.	E.		10	E.	E.			E.	E.		S.
Standard				210			1000	150	12′ 0″	6′ 6″	6′ 1″	W&St.	Un.	6	1¾	Tim.	DC.	FS.	Wire	17	5.25/17	B&S	PL.	Mas.	Ply.	6	Hng.	E.		DuAl.	Fir.	E.	E.		E.	E.		10	E.	E.			E.	E.		S.
Travelcar	Junior	2–4			325	1200	150	11′ 3″	6′ 5″	7′ 7″	StF.	In.	11		Own.		CHN.				RU.	TC.	Pine.	Ply.	4		Brz.	1	Ply,J,F.	Fir.	Lin.	1d.	50	Al.	8	S.	E&I.	E.					
Travelcar	Series 616	2–6	475			1800	175	16′ 6″	6′ 5″	7′ 7″	S.F.	In.	11		Own.		CHN.	StS.	17	5.50/17	RU.	TC.	Pine.	Ply.	9	Sld.	Brz.	1	Ply,J,F.	Fir.	Lin.	2d.	50	Al.	30	S.	E&I.	E.	Yes.		Ben.	E.	S.
Travelcar	Series 618	2–6	595			2300	225	18′ 6″	6′ 5″	7′ 7″	StF.	In.	11		Own.		CHN.	StS.	17	5.50/17	RU.	TC.	Pine.	Ply.	9	Sld.	Brz.	1	Ply,J,F.	Fir.	Lin.	2d.	50	Al.	30	S.	E&I.	E.	Yes.		Ben.	E.	S.

*—Overall dimension
½E—Semi-Elliptic Al—Aluminum
Alc—Alcohol (stove)
AuP—Auto Plate AuT—Auto Type
Az—Azrock, Asphalt Tile
Ben—Bendix (Brakes)
Brz—Bronze B&S—Ball and Socket
C&F—Cypress and Fir
Cas—Caster Wheel
Cas—Casement (windows)

Cel-Al—Celotex padding and aluminum paint
Chr—Chromium ChSt—Channel Steel
CHN—Chrome Nickel Steel
C&Ply—Canvas over Plywood
CM—Chrome Molybdenum
Col—Coleman (stove)
CoPd—Cotton Padding
Cop—Copper d—double
DC—Drop Center

DCR—Drop Center—roller bearing
DuAl—Duck and Aluminum Paint
E—At extra cost Enl—Enamel
E&I—Exterior and Interior
FPly—Fir Plywood Fix—Fixed
FS—Forged Steel Gas—Gasoline
Gr—Guard Rail Gl—Galvanized Iron
Hng—Hinged (windows)
In—Independently Sprung
J—Jack

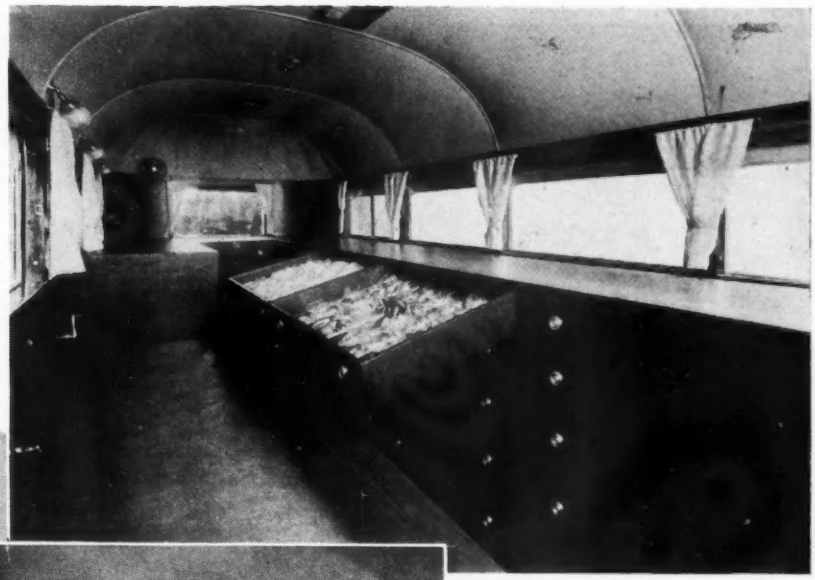
JC—Jack and Caster Wheel
Lea—Leatherette Lin—Linoleum
Lig—Liggett
L&P—Leatherette and Padding
L&Pl—Leatherette and Plywood
MPly—Mahogany Plywood
MsL&P—Masonite, Leatherette and Plywood
Ma-Pl—Masonite and Plywood
Mas—Masonite

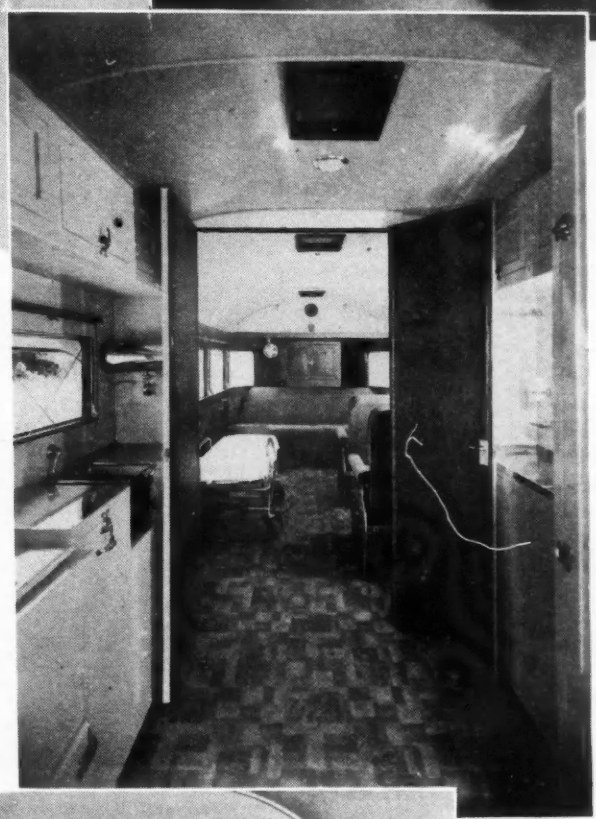
M&SS—Masonite and Sheet Steel
Met—Metal Moly—Molybdenum
NS—Nickel Steel O—Optional
O&C—Oak and Cypress
O&S—Oak and Steel
O&Sp—Oak and Spruce
Pat—Patented
Pfb—Porcelain Foot Bath
Pla—Plate Glass
PL—Parking Leg Ply—Plywood

Ply-C—Plywood, canvas covered
Ply-Fab—Plywood, fabricated
Ply,J,Al—Plywood, Jute and Aluminum Paint
PlyJF—Plywood, Jute and Fabric
PoEn—Porcelain Enamel
Por—Porcelain
PP—Patented, Pneumatic
PS—Pressed Steel
RU—Rubber Universal

s—Single S—Standard
Sht—Shatter proof Sld—Sliding
Sp—Spruce SS—Sheet Steel
SST—Stainless Steel St—Steel
StF—Steel Frame StS—Steel Spoked
TC—Telescone Stand, Caster Wheel
THn—Top Hinged Tri—Tripod
T&J—Tripod and Jack
Un—Underslung
W&St—Wood and Steel Y—Yes

Construction specifications:
Chassis: Wood braced with metal
Springs: 9 leaves, semi-elliptic
Axle: Alloy steel, 4-in. drop center
Wheels: 17-in. wire, Timken roller bearings
Tires: 5.50 x 17 in.
Coupling: Ball and socket
Parking: Jack and caster
Exterior Walls: Masonite
Interior Walls: Plywood
Windows: 7 or 8, varying treatment
Screens: 16 copper mesh
Ventilators: One or two in roof





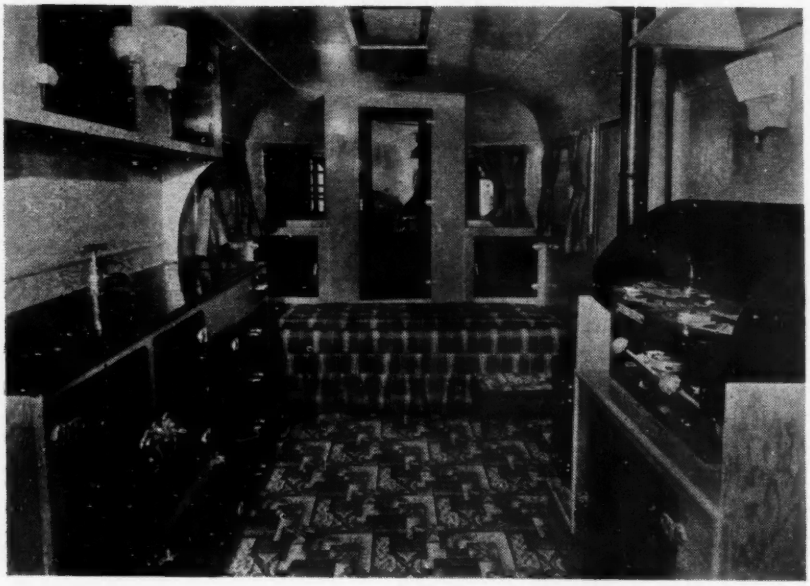
Interior of an Aerocar used by the Fostoria Glass Co., 2500 pieces of glassware in satin lined drawers are ready for display

This Aerocar trailer has double doors in the rear through which this view was taken. For the care of an invalid the equipment seems complete with accommodations for nurse and attendant as well as the patient

Interior of a car used by the Cities Service with seats set up ready for a lecture. A motion picture machine is in the rear with a screen in the front

Top: Plywood, canvas covered, aluminum paint
Floor Frame: Wood, metal braced
Floor: Fir
Floor Covering: Linoleum

Some of the most striking engineering features as well as hints as to future developments are found in the deviations from these average specifications. Chassis, frame, wall and top construction undergo the greatest variety of treatment. Nineteen thirty-six models show a trend away from the wood chassis and substitution of steel. Sometimes channel steel is used with wood inserts; otherwise all-steel, electrically welded. Trotwood combines channel steel with seamless drawn tubing. Travelcar, declaring that a wood frame would not suffice a house subjected to repeated earthquakes, carries the use of steel construction even to the side wall and roof framing, and claims greater strength and lighter weight than obtained with orthodox wood framing. The wall panels are set into the steel frame with a mastic. Aerocar obtains additional strength with light weight by using struts, longerons and cross-wire bracing in the aeronautical manner.



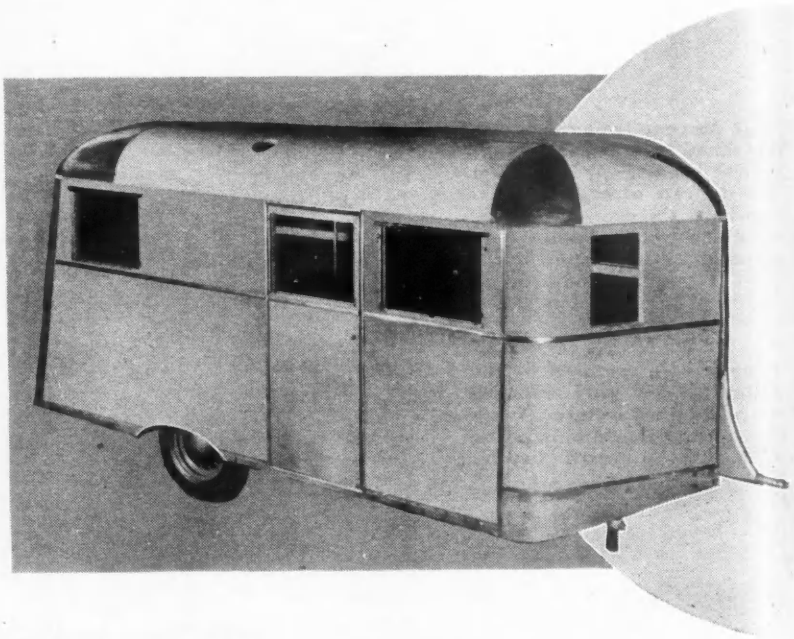
Two double beds and many living comforts are built into the Master models of the Covered Wagon Co.

Top construction aims at insulation and watertightness and a variety of ways are employed to achieve this end. Duck or canvas stretched over plywood or Masonite is common practice, but the decking may also be auto top material or Fabricoid. Insulating properties are given by Cellotex and padding, wool or jute, and in the higher priced models aluminum foil is beginning to be used. Regardless of top materials used, aluminum paint is employed to reflect the sun's rays.

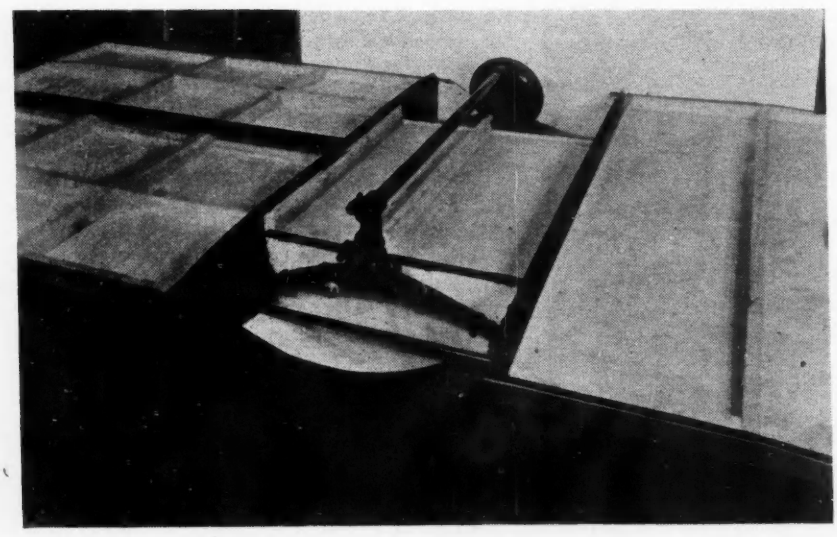
Couplings are universally of the ball-and-socket type and the majority are combined with a built-in jack and caster wheel. This construction permits a trailer to be uncoupled and parked by a single person. Rubber-tired casters are now appearing. The most radical departure from orthodox design is found on the Aerocar. This product, stemming from designs of Glenn Curtiss, has a goose-neck front end which couples to the car by means of a device comprising a welded angle steel frame to which are bolted curved

Tempered Masonite for exterior walls and plywood for the interior panels is well nigh standard construction. All builders employ an air space between wall surfaces for insulation. Exceptions in the use of materials are: Fabricoid glued to panels; leatherette over-padding as found in the Covered Wagon, and duck or leather-wove fabric over panels. Split Coach, Rambler model, has sheet-steel exterior walls and Masonite interior. Metro Cruiser has sheet steel for the front and back walls alone; while Silver Dome uses steel for the corners of the top and side walls.

Two explanations can be advanced for the slow adoption of sheet steel for body panels. One is the need for keeping weight as low as possible; the second is the lack of production facilities capable of handling the work on a low cost, quantity basis.



The Silver Domes are coming forth on a production basis. Here is a model ready for finishing



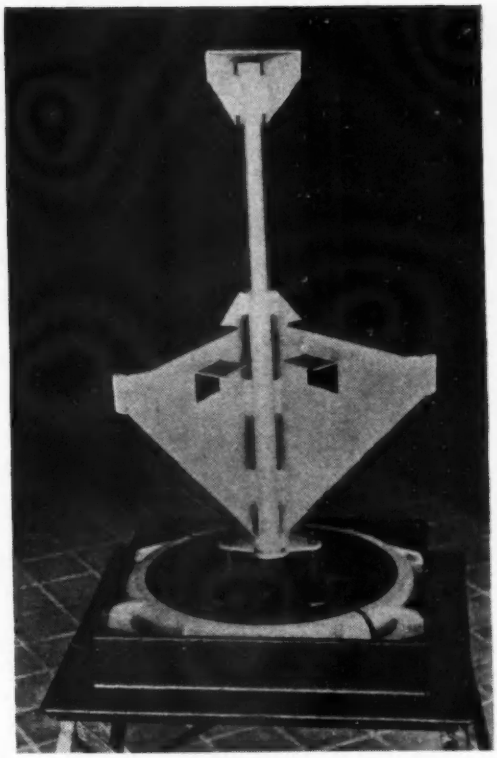
Here is shown the construction of a Silver Dome Chassis

aluminum castings. These castings hold an aluminum fifth wheel and a pneumatic casing and tube horizontally so that when the entire unit is installed in the rear of a coupe it provides a pneumatic universal joint at the point of coupling.

Several of the undercarriage units follow closely upon automobile practice, thus we find independent suspension being introduced by such trailers as Travelcar and Trotwood; wire wheels, often the standard Ford product, giving ground to the newer type of pressed steel, smaller in diameter, and tires following suit so that both tires and wheels can be interchangeable with car equipment.

"Standard," as applied to equipment, has come to mean beds, ice box, sink, water tank, cook stove, and electrical wiring and lighting fixtures. Beds may be strictly beds or dual purpose couches; where quarters are cramped, Pullman type berths are often used. Water tanks vary from 5 to 30 gal. in capacity and in the facilities for filling. Usually a pump is applied at the sink, but gravity feed is also used. Stoves are either kerosene or gasoline, porcelain approaches standard for sinks, but aluminum, stainless steel and chromium are used.

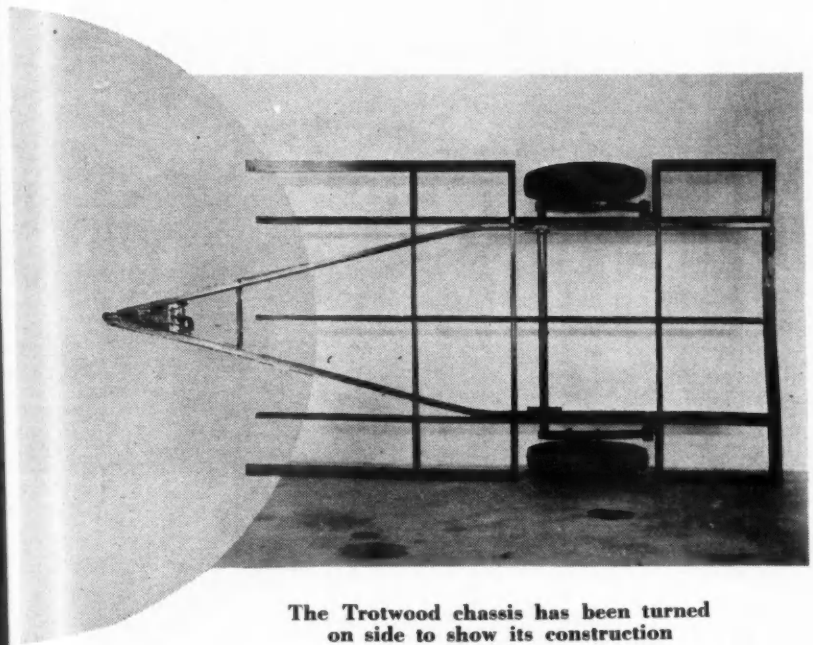
Aerocar assembly with nose pin locked in the coupler



The electrical equipment comprises wiring for 6-volt and 110-volt circuits; the former to be run from the car or extra battery; the latter from a plug-in outside circuit. Tail, stop and running lights are standard for the exterior, while two or three dome lights and outlets for attaching electrical devices are furnished for interior. Built-in radio aerials are universal.

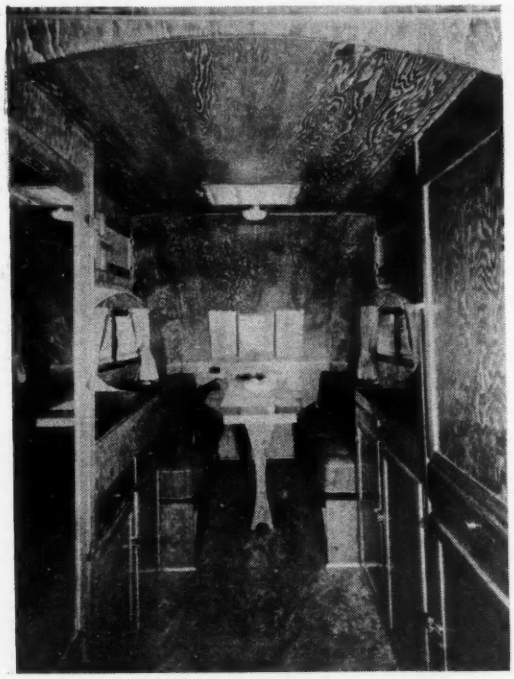
Extra equipment comprises bathing and toilet facilities, heating stove, battery and container, rear bumper and brakes. That these last two items should not be regarded as necessities and be included in the standard equipment may come as a surprise. Power brakes, usually Bendix, are offered by most producers at a price of $50 to $75, the charge for attaching not always specified. Their value is indicated by their inclusion in the regular equipment of the highest-priced models. Whether or not brakes become standard would seem to hinge upon accident experience. If car brakes prove inadequate for emergencies when trailers become more common, legislatures may require brake installation.

Specifications of finishes and equipment in the form of cabinets, drawers, lockers, etc., defy classification, but it is in these particulars that great cost variations arise. The choice of wood and its use, solid or as a veneer, var-



The Trotwood chassis has been turned on side to show its construction

A welding gang of the Pennsylvania R. R. is using this trailer for living quarters



Inside view of a Kozy Koach

Observation cockpit similar to the one in the Florida Year Round Club trailer shown on page 832

nished or oil rubbed, makes a vast difference in the amount of hand labor involved. Cabinets are the "gadgets" of the trailer, and great stress is laid upon the character, design and number offered. They are the talking points, but it is by no means certain that multiplicity of these items will have the appeal once the public becomes experienced in trailer travel.

The conventional trailer simulates a street car diner more than any other known product, and this is not to speak disparagingly of it. Recent design trends are away from the box-like structure, more grace being given by streamlining, so-called. Front ends are sometimes V-shaped; rear ends are being given what the automobile industry once termed the beaver back. The necessity for headroom imposes certain limitations on design, and efforts are being made to get around them. Sears Roebuck's open-and-shut product is an example, but there is a much older and more elaborate example on the market —the Split Coach.

The Split Coach, as the name implies, splits down the center, to expand and give larger living quarters. Actually, width is increased 4 ft. and headroom 2 ft. The automobile industry's own William Stout is a recent contributor to this expansible type of trailer; his product goes one step further to provide a house with rooms, and is perhaps more a transportable house than a device for travel and camping.

The Pribil Air Car, product of the Saginaw Stamping & Tool Co., which needs no introduction to the automotive industry save to add that it has become a prominent supplier of trailer units, examples another and even more radical departure from orthodox design. The Pribil is a hybrid, stemming from automobile and trailer parents, and it is in effect a three-wheel, motor driven car—a self-propelled trailer.

This product, soon to be launched, opens up vistas of its own. Propulsion is by means of a small, four-cylinder, water-cooled engine, located in the rear and driving the single rear wheel. The car is fully streamlined and extremely low hung. A road clearance of 9½ in. is obtained with a floor only 11 in. from the ground. The front wheels have knee-action type suspension and are fastended to the frame. From one side of the family it gets hydraulic brakes and a conventional steering gear. Reminiscent of the Scarab, it has large observation windows, seats for seven with room for a table, but at this point the similarity ends, because it is capable of sleeping and feeding four persons, and, it is claimed, will do 50 m.p.g. at a maximum speed of 50 m.p.h.

One can hardly call the Pribil Air Car a trailer, yet trailer design has influenced it. It seeks to obviate the high capital investment involved in the ownership of two units with the trailer unit idle perhaps much of the time; it attempts to consolidate good features in a single unit, as, for instance, reducing the necessary parking space to 15 ft. The future of such a vehicle is problematical, but this can be said: it is the product of a company which has seen the inside and outside of both automobile and trailer business and is eminently qualified to make such a departure from the conventional.

Trailer manufacture is at present in its infancy. There is no question about it. Design and construction of the product, manufacturing methods, distribu-

tion and selling are all in the elementary stages and passing through a rapid transformation. We can hazard the thought that steel will ultimately replace wood for chassis and frame construction and that this change will accompany the transition from handicraft to mass production methods of manufacture. Larger volume, permitting a higher degree of plant mechanization, will in turn permit the use of many materials and manufacturing methods not now practical.

Some degree of standardization has already taken place, as the prevalence of bread-and-butter models indicates. Specifications testify to it and so do prices, which speak either a dollar-and-cents drop from a year ago or the equivalent of a price reduction through the giving of more value for the money.

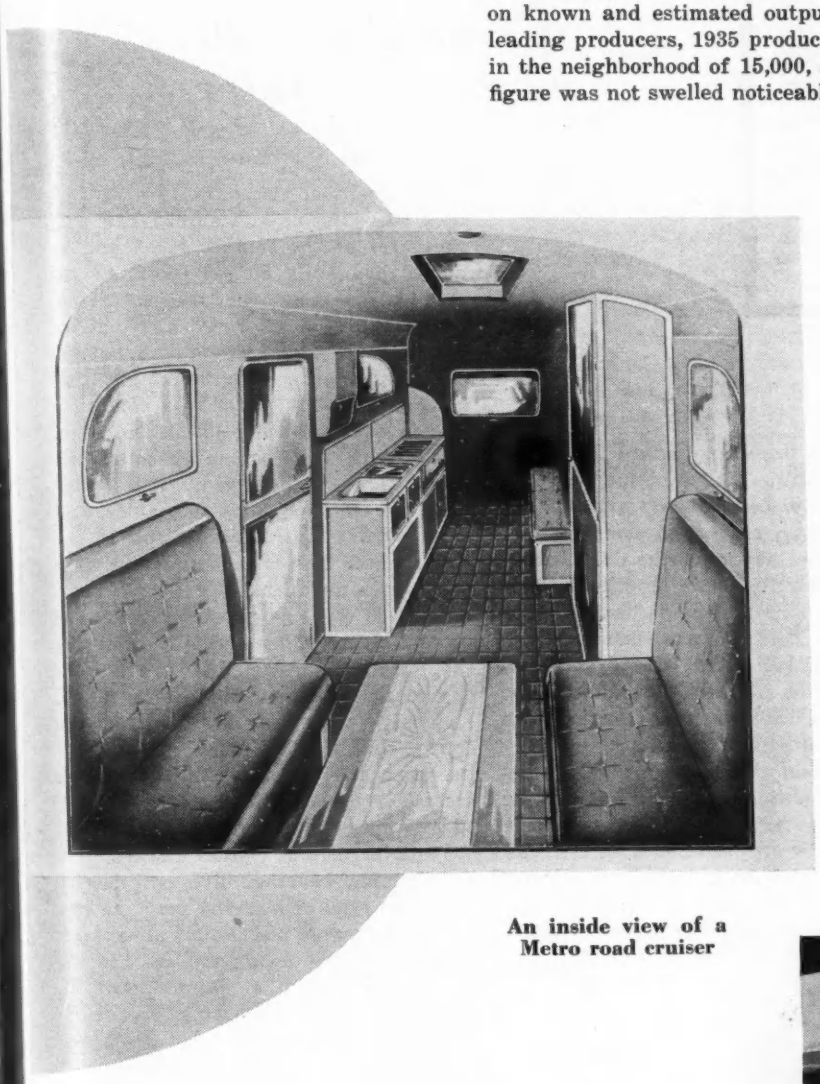
Distribution and sales are quickly breaking away from the you-write-me, I'll-write-you, come-and-get-it stage, and the change comes none too quickly. Wider distribution is now essential to the maintenance of higher factory schedules; the ratio of one sale to 50 mail inquiries is a thing of the past. Yet producers have no concrete idea of the potential market. Estimates of 1935 production are no infallible guide, because they aren't possible of corroboration. They range all the way from the out-the-window guess of 3000 to the wishful expression of 50,000. Basing on known and estimated output of the leading producers, 1935 production was in the neighborhood of 15,000, and that figure was not swelled noticeably by the build-your-own enthusiast. Babson has predicted that half of the United States will soon be living in trailers. Well, we once thought 8,000,000 was the limit of automobile consumption, and one man's guess is as good as another's in this astonishing country.

If the commercial use of trailers is included in all guesses of potentials, many estimates are not excessive, but appraisal of the commercial market is usually neglected. If public demand has not been scratched, neither has this other market. Trailers as shells, equipped to display merchandise, have met with great success in limited try-outs. Aerocar has sold trailers for display, for hotel, club, private school and race-horse transportation and offers a specially-fitted ambulance. Why not trailers for lending libraries, educational exhibits, itinerent merchants and field work? General Electric uses over 60 Aerocar units and Schelm Bros. boasts the outfitting of more than 150 individual companies with display coaches last year.

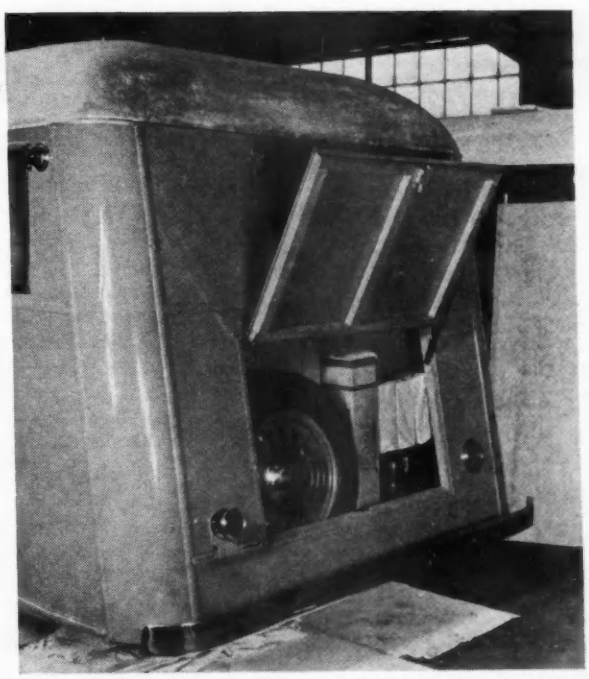
Long before half the residents of these United States take to mobile living, legislatures will decide that the trailer is a good article to tax, existing lenient load and dimensional regulations may become more circumscribed, and sanitary codes may be imposed. An industry in its infancy faces a host of unknown factors, not yet predictable. Yet when they have all materialized they will have been surmounted and the trailer business will be a substantial one.

To reach its ultimate development the trailer industry will come more and

(*Turn to page 855, please*)



An inside view of a Metro road cruiser



The rear end of a Silver Dome model with extra storage room

Parking Maneuvers Facilitated

with a new Ross steering gear called the Twin-Lever

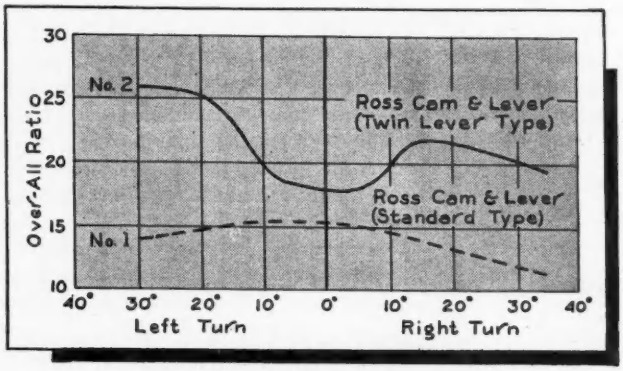


Fig. 1—Variation of over-all steering ratio with steering angle

A NEW type of steering gear, known as the Twin-Lever, has been added to the line of the Ross Gear & Tool Co., Lafayette, Ind. One of its advantages is that it gives the driver a greater mechanical advantage when the front wheels are swung far over to one side, as required in parking maneuvers. In Fig. 1 herewith, the lower curve shows the variation of the over-all ratio of the steering mechanism with angular distance from the central position for the standard type of Ross cam-and-lever steering gear, while the upper curve shows the same thing for the Twin-Lever type of gear. The improvement in this respect is due in part to the gear itself and partly to changes in the steering linkage made possible by this gear. It will be noted that within the range of 15 deg. and more to each side of the central position (or what is known as the parking range), the mechanical advantage is nearly doubled.

Controlability at high speeds depends on what is referred to as "road sense," that is, the ability of the driver to properly correct for side winds, centrifugal action on turns, and body movements due to road irregularities, by utilizing his sense of touch. "Road sense" in turn depends on the degree of reversibility of the steering gear and is greatly reduced or entirely eliminated if the steering reduction is very high. This makes it desirable to lower the steering reduction at and near the central position of the steering gear, the so-called high-speed steering range.

In the twin-lever steering gear the range of angular motion of the steering arm is 100 deg., as compared with 80 deg. in the present standard Ross gear. As a result, the minimum turning radius may be reduced without any sacrifice with respect to steering ease, as a greater throw of the drag link is obtained for the same length of steering arm. This feature is desirable for passenger cars for maneuvering into and out of restricted spaces, and it is coming to be increasingly valuable for commercial vehicles, particularly in crowded metropolitan areas.

The shorter steering arms and resulting increased mechanical advantage from the driver's end, reduce the shocks which can be transmitted from the road wheels to the driver's hands. Within the normal driving range, with the front wheels in or close to the straight-ahead position, two studs are in contact with the cam, whereby the unit pressures at the contact areas are reduced, nominally 50 per cent. As the gear moves away from the central position, into the parking range, all of the load comes on a single stud, but the effective leverage of the single stud increases rapidly under this condition, and in the extreme position the effective leverage is 45 per cent greater than in the standard Ross gear. It is stated that the efficiency of the gear is constant over its entire range, and 10 per cent greater than that of previous Ross gears with fixed stud.

Cams of these new steering gears are ground on machines specially built for the purpose and which assure a high degree of accuracy and a fine finish. Extensive wear tests are said to have shown that the increased contact and the high degree of finish reduce the frequency of adjustments for wear by 33 per cent.

Tests on various chassis showed that anti-friction bearings are not needed with this type of steering gear, as the greatly increased mechanical advantage obtained by the design reduces the effort required. It is claimed that in operation the new steering gear conveys a feeling of solidity and precision, which is due to the elimination of lost motion, and that with respect to simplicity and stability of adjustments the new gear is the equivalent of previous Ross gears.

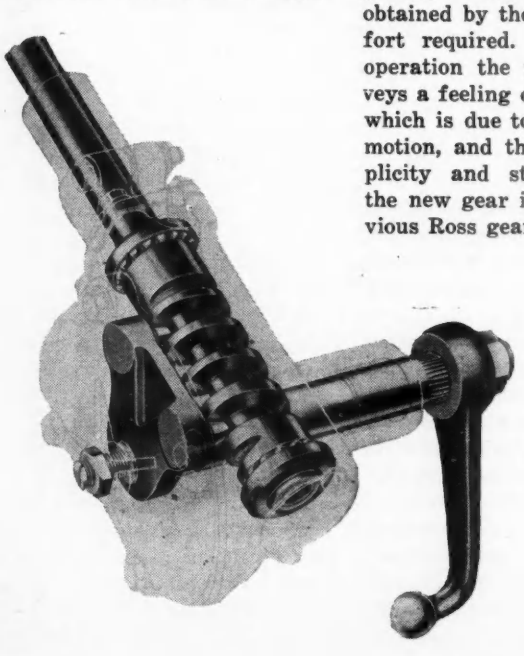


Fig. 2—Phantom view of Ross Twin-Lever steering gear

The Horizons of Business

By Joseph Stagg Lawrence

A Fair Price

LAST month the Supreme Court placed another measure of the New Deal alongside the Constitution and declared that the two were not reconcilable. The Guffey Act used the taxing power of the Federal Government to control the production of soft coal, its price and the working conditions of the miners. The bill contained ample evidence that it was not a revenue measure. In fact, its defense as a constitutional exercise of Federal power rested upon a broad conception of commerce embracing the conditions of production. The acts of mining, transportation and consumption under this conception were related steps in a closely integrated process, all of which were viewed as a single economic action subject to the Federal power because at one stage the product moved across state lines. This view the Supreme Court would not accept in the Schechter case. Its judgment is fully sustained in a long line of decisions. If the reasoning of the Government were accepted then the limitations upon Federal power would be meaningless and every form of economic activity would be subject to Washington.

Congress and the Administration have taken a strong position in the soft coal industry. The cynic may note that the vigor and persistence of this intercession are closely geared to the political power of the coal miners and their able chief. However, it is only fair to add that more detached considerations flowing from what may, with apologies, be termed the deeper philosophy of the New Deal have also actuated this legislation. Since the court decision, Congress, in spite of a bitter fight over the tax bill, the death of Speaker Byrnes and the Cleveland convention, has been struggling to rehabilitate a badly perforated plan of bituminous coal control.

The Function of Price

It is doubtful if anything defines so clearly the conflict between a controlled economy on the one hand and a self-operating economy on the other, as the attempt to establish a price by law. The social controller considers price the instrument through which a fair return is assured the producer. The *laisser faire* individualist holds that the sole purpose of price is to equate supply and demand. The former imparts to price a moral character and a social duty. The latter considers price a cold, functional device with a definite task to perform no matter what the incidence of that task may be upon human welfare. To be sure, he believes that the over-all effect of this cold conception is socially beneficial even though the particular application be ruthless.

The Farm Board

These abstractions become significant only as we observe their concrete applications in our own world. The Farm Board, with its highly publicized $500 million revolving fund, was created as the first act of the Hoover Administration. Its purpose was to raise the purchasing power of the farmer and promote parity between the real incomes of the urban and rural worker. To this end the prices of cotton and wheat were fixed at levels which would assure the producers an equitable income. The emphasis was all on the return to the farmer. The facts are fresh, although the implications did not seem to be grasped by the Hoover Administration any more than they are by the present government.

Under a rigid price status a portion of the demand for American farm products was stifled or satisfied from other sources while the supply on the American side mounted. Although the dissolution of the Farm Board was hailed as the end of an unsound experiment, the course of events in the interval prove that this jubilation was premature.

The entire NRA was based upon the same old medieval concept of a just price, *i.e.*, a price which would assure the producers a fair return. That the failure of American business to accompany the rest of the world on its recovery slope was the direct consequence of a universal attempt to apply a just price to American economy was not appreciated either by the friends or the foes of the Administration. The latter were disposed to think of the NRA in terms of individual initiative and regarded the Schechter decision as a repudiation of regimentation. The fact is the theory of a just price implicit in the NRA did not permit price to function as an automatic regulator of supply and demand. Under the codes the producers themselves determined what price would yield them a fair return, with the result that all NRA prices were too high and consumption lagged.

A Just Price for Labor

Relief and unemployment are two related problems, both of which trace directly to the insistence of our Government upon a just price for labor. Messrs. Hopkins and Tugwell fairly represent the attitude of the Administration. They have calculated painstakingly a minimum "necessary" income for the worker. This seems to be an annual return of $2,000. It has been necessary for Mr. Hopkins in the distribution of his billions to compromise on about $80 a month, which amounts to a little less than half the irreducible minimum. Mr. Hopkins does not think of wages as a price for labor operating to establish a balance between supply and demand. He starts with what the worker "ought" to have instead of with the rate at which he will find a job. When the country fails to absorb the idle, he and his colleagues accuse business of refusal to cooperate.

Primitive Theory

The truth is that the New Dealers have one conception of price, whereas American business has developed and prospered under an entirely different conception. The just price idea, the notion of a minimum fair return to all workers irrespective of the economic value of their services, is neither modern nor liberal. Hundreds of years ago the western world was ruled by the theory that price must be viewed as a return to the worker and that its job was to assure that worker a fair return. The theory was refined by theologians, taught by the church and enforced by custom. While it prevailed, enterprise

(*Turn to page* 851, *please*)

Mechanical Specifications

These Specifications are brought Up-to-Date Each Month by the

Line Number	MAKE AND MODEL	Lowest Priced 4-door Sedan	Wheelbase (Ins.)	Tire Size (Ins.)	ENGINE														CHASSIS				
					No. of Cylinders, Bore and Stroke	Taxable H.P.	Piston Displacement (Cu. Ins.)	Maximum Brake H.P. at Specified R.P.M.	Compression Ratio (to—1.)	Displacement Factor ††	Cylinder Head Material	Camshaft Drive Make	Piston Material	Oil Cleaner Make	Air Cleaner Make	Carburetor Make	Muffler Make	Electrical System Make	Battery Make	Clutch Type and Make	Gearset Make	Universals Type and Make	Rear Axle Type and Make	Service Brake Type and Make
1	Auburn.....654	$ 795	120	6.00/16	6-3 1/16x4 3/4	22.5	209.9	85-3500	6.20	37.4	Al..	Whit.	Al...	Pur..	AC..	Str....	Buf..	A...	USL.	P.Long..	WG..	Nb-Mec	1/2 Col...	BH..
2	Auburn.....852	1095	127	6.50/16	8-3 1/16x4 3/4	30.0	279.9	115-3600	6.50	41.4	Al..	Whit.	Al...	Pur..	AC..	Str....	Buf..	A...	USL.	P.Long..	Det..	Nb-Mec	1/2 Col...	BH..
3	Auburn.....SC852	1545	127	7.00/16	8-3 1/16x4 3/4	30.0	279.9	150-4000	6.50	....	Al..	Whit.	Al...	Pur..	AC..	Str....	Buf..	A...	USL.	P.Long..	Det..	Nb-Mec	1/2 Col...	BH..
4	Austin.....	... ..	75	3.75/18	4-2.2x3	7.8	45.6	13-3200	5.30	....	CI..	Spir..	Al...	No...	No...	Til....	Buf..	A...	USL.	P.Rock..	WG..	F-Spi...	1/2 Sal...	M.m.
5	Buick.....36-40	885	118	6.50/16	8-3 1/2x3 7/8	30.6	233.0	93-3200	5.65	39.6	CI..	LB..	Ala..	No..	AC..	Str....	Wal..	D...	Del..	P.Own..	Own.	m-Spi...	1/2 Own..	OH..
6	Buick.....36-60	1090	122	7.00/15	8-3 1/16x4 1/2	37.8	320.2	120-3200	5.45	....	CI..	LB..	Ala..	AC..	AC..	Str....	Wal..	D...	Del..	P.Own..	Own.	m-Spi...	1/2 Own..	OH..
7	Buick.....36-80	1255	131	7.00/16	8-3 1/16x4 1/2	37.8	320.2	120-3200	5.45	40.7	CI..	LB..	Ala..	AC..	AC..	Str....	Wal..	D...	Del..	P.Own..	Own.	m-Spi...	1/2 Own..	OH..
8	Buick.....36-90	1695	138	7.50/16	8-3 1/16x4 1/2	37.8	320.2	120-3200	5.45	....	CI..	LB..	Ala..	AC..	AC..	Str....	Wal..	D...	Del..	P.Own..	Own.	m-Spi...	3/4 Own.	OH..
9	Cadillac.....V8-60	1695	121	7.00/16	8-3 1/16x4 1/2	36.4	322.0	125-3400	6.25	45.7	CI..	Mor..	Ala..	No...	AC..	Str....	Old..	D...	Del..	P.Long..	Own.	Nb-Mec	1/2 Own..	BH..
10	Cadillac..V8-70 & 75	2445	131-38	7.50/16	8-3 1/2x4 1/2	39.2	346.0	135-3400	6.25	(a)	CI..	Mor..	Ala..	No...	AC..	Str....	Old..	D...	Del..	P.Long..	Own.	Nb-Mec	1/2 Own..	BH..
11	Cadillac..V12-80 & 85	3145	131-38	7.50/16	12-3 1/16x4	46.9	368.0	150-3600	6.00	(b)	CI..	Mor..	Ala..	Han..	AC..	DL....	Old..	D...	Del..	P.Own..	Own.	Nb-Mec	1/2 Own..	BH..
12	Cadillac.....V16-90	7250	154	7.50/17	16-3x4	57.5	452.0	185-3800	6.00	43.7	CI..	Mor..	Ala..	Cu...	AC..	DL....	Own.	D...	D....	dp.Own..	Own.	Nb-Mec	3/4 Own..	KP..
13	Chevrolet..Mas. Con.	640	113	5.50/17	6-3 1/16x4	26.3	206.8	79-3200	6.00	35.2	CI..	Own.	CI...	No...	AC..	Car....	Own.	D...	D....	P.Own..	Own.	m-Own..	1/2 Own..	OH..
14	Chevrolet..Mas. Ind.	.....	113	5.50/17	6-3 1/16x4	26.3	206.8	79-3200	6.00	34.6	CI..	Own.	CI...	No...	AC..	Car....	Own.	D...	D....	P.Own..	Own.	m-Own..	1/2 Own..	OH..
15	Chevrolet.....Std.	575	109	5.25/17	6-3 1/16x4	26.3	206.8	79-3200	6.00	39.5	CI..	Own.	CI...	No...	AC..	Car....	Own.	D...	D....	P.Own..	Own.	m-Own..	1/2 Own..	OH..
16	Chrysler.....Six	875	118	6.25/16	6-3 1/16x4 1/2	27.3	241.5	93-3400	6.00	41.5	CI°	Ch...	Ala..	Pur..	Bur..	Car....	NS..	A...	Wil..	P.B&B..	Own.	Nb-UP..	1/2 Own..	LH..
17	Chrysler...DeLuxe 8	1045	121	6.50/16	8-3 1/4x4 1/2	33.8	273.8	105-3400	6.20	43.3	CI°	Ch...	Ala..	Pur..	AC..	Str....	NS..	A...	Wil..	P.B&B..	Own.	Nb-UP..	1/2 Own..	LH..
18	Chrysler...Airflow 8	1345	123	7.00/16	8-3 1/4x4 1/2	33.8	323.5	115-3400	6.20	41.8	CI°.	Ch...	Ala..	Pur..	AC..	Str....	Bur..	A...	Wil..	P.B&B..	Own.	Nb-UP..	1/2 Own..	LH..
19	Chrysler..Air. Imp. 8	1475	128	7.50/16	8-3 1/4x4 1/2	33.8	323.5	130-3400	6.50	42.4	Al..	Ch...	Ala..	Pur..	AC..	Str....	Bur..	A...	Wil..	P.B&B..	Otwg.	Nb-UP..	1/2 Own..	LH..
20	Chrysler.Af.Cus.Im.8	.....	137	7.50/16	8-3 1/4x4 1/2	33.8	323.5	130-3600	6.50	....	Al..	Ch...	Ala..	Pur..	AC..	Str....	Bur..	A...	Wil..	P.B&B..	Otwg.	Nb-UP..	1/2 Own..	LH..
21	Cord.....810	1995	125	6.50/16	8-3 1/2x3 3/4	39.2	288.6	125-3500	6.50	....	Al..	Whit.	Al...	No...	AC..	Str....	Buf..	A...	USL.	P.Long..	Own.	.....	Tu Own.	LH..
22	De Soto..Airstream 6	810	119	6.25/16	6-3 1/16x4 1/2	27.3	241.5	93-3400	6.00	(c)	CI°	Ch...	Ala..	Pur..	Bur..	Car....	NS..	A...	Wil..	P.B&B..	WG..	Nb-UP..	1/2 Own..	LH..
23	De Soto....Airflow 6	1095	115 1/2	6.50/16	6-3 1/16x4 1/2	27.3	241.5	100-3400	6.50	35.6	Al..	Ch...	Ala..	Pur..	AC..	Car....	NS..	A...	Wil..	P.B&B..	Own.	Nb-UP..	1/2 Own..	LH..
24	Dodge.....Six	735	116	6.00/16	6-3 1/4x4 3/8	25.3	217.8	87-3600	6.50	40.0	CI..	Ch...	Als..	Pur..	AC..	Str....	NS..	A...	Wil..	P.B&B..	Own.	Nb-UP..	1/2 Own..	LH..
25	Duesenberg.....J	.....	142-153 1/2	7.00/19°	8-3 5/16x4 3/4	45.0	419.7	320-4200	5.20	....	CI..	LB..	Al...	Pur..	Y....	Str....	.....	D...	Exi..	dp.Long.	Own.	m-Spi...	1/2 Own..	PH..
26	Ford.....V8	580	112	6.00/16	8-3 1/16x3 3/4	30.0	221.0	85-3800	6.30	41.2	Al..	Gear	Al...	No...	Yes	Str....	Own.	O...	Own.	P.Os....	Own.	m-Own..	3/4 Own.	OM..
27	Graham.....6-80	665	111	6.00/16	6-3x4	21.6	169.6	70-3500	6.80	37.1	Al..	LB..	Als..	No...	AC..	Mar...	Old..	D...	Wil..	P.Ill....	WG..	Nb-Spi...	1/2 Spi...	OH..
28	Graham.....6-80A	625	111	5.25/17	6-3x4	21.6	169.6	70-3500	6.80	....	Al..	LB..	Als..	No...	AC..	Mar...	Old..	D...	Wil..	P.Ill....	WG..	Nb-Spi...	1/2 Spi...	OH..
29	Graham.....6-90	795	115	6.00/16	6-3 1/4x4 3/8	25.3	217.8	85-3300	6.70	39.7	Al..	LB..	Als..	No...	AC..	Mar...	Old..	D...	Wil..	P.Ill....	WG..	Nb-Spi...	1/2 Spi...	OH..
30	Graham.....6-90A	745	115	6.00/16	6-3 1/4x4	25.3	199.1	80-3300	6.70	44.2	Al..	LB..	Als..	No...	AC..	Mar...	Old..	D...	Wil..	P.Ill....	WG..	Nb-Spi...	1/2 Spi...	OH..
31	Graham S. C 6, 110	895	115	6.25/16	6-3 1/4x4 3/8	25.3	217.8	112-4000	6.70	....	Al..	LB..	Als..	Fram	AC..	Mar(s).	Old..	D...	Wil..	P.Ill....	WG..	Nb-Spi...	1/2 Spi...	OH..
32	Hudson.....6-63	785	120	6.00/16	6-3x5	21.6	212.0	93-3800	6.25	39.3	CI.°	Ge°.	Al...	No...	AC..	Car....	Old..	A...	Nat..	P.Own†.	Own.	Nb-Spi..	1/2 Own..	BH..
33	Hudson..8, 64-5-6-7	830	120-127	6.25/16	8-3x4 1/2	28.8	254.0	113-3800	6.00	(d)	CI.°	Ge°.	Al...	No...	AC..	Car....	Old..	A...	Nat..	P.Own†.	Own.	Nb-Spi..	1/2 Own..	BH..
34	Hupmobile....618-G	855	118	6.00/16	6-3 1/2x4 1/4	29.4	245.3	101-3600	5.75	45.4	CI..	Mor..	Als..	No...	Bur..	Car....	Old..	A...	Wil..	P.B&B..	WG..	Nb-Spi..	1/2 Spi...	LH..
35	Hupmobile....621-N	1035	121	6.50/16	8-3 5/16x4 3/4	32.5	303.2	120-3500	5.80	47.3	CI..	Mor..	Als..	No...	Bur..	Car....	Old..	A...	Wil..	P.Long..	WG..	Nb-UP..	1/2 Spi...	LH..
36	Lafayette.....3610	675	113	6.00/16	6-3 1/4x4 3/8	25.3	217.7	83-3200	5.61	39.4	CI..	Whit.	Als..	No...	AC..	Str....	.....	A...	USL.	P.B&B..	Own.	Nb-....	1/2 Own..	BH..
37	La Salle.....36-50	1185	120	7.00/16	8-3x4 5/8	28.8	248.0	105-3600	6.25	39.0	CI..	Whit.	Al...	No...	AC..	Str....	Old..	D...	Del..	P.B&B..	Own.	Nb-Mec	1/2 Own..	BH..
38	Lincoln.....Zephyr	1275	122	7.00/16	12-2 3/4x3 3/4	36.3	267.3	110-3900	6.7	42.5	Al..	Gear	St...	.....	Yes..	Str....	Own.	O...	Own.	P.Os....	Own.	m-Own..	3/4 Own..	MO..
39	Lincoln.....V12	.....	136-145	7.50/17	12-3 1/16x4 1/2	46.8	414.0	150-3400	6.38	41.5	Ala.	Ch...	Ala..	Pur..	Yes..	Str....	Own.	A...	Exi..	P.Long..	Own.	.....	FF Tim.	M...
40	Nash....Ambassador	885	125	6.25/16	6-3 5/16x4 3/8	27.3	234.8	93-3400	5.70	36.8	CI..	Whit.	Als..	Own.	AC..	Str....	.....	A...	USL.	P.B&B..	Own.	Nb-Mec	1/2 Own..	BH..
41	Nash..Amb. Super 8	995	125	6.50/16	8-3 1/16x4 1/4	31.2	260.8	102-3400	5.25	36.5	CI..	Ch...	Als..	Own.	AC..	Str....	.....	A...	USL.	P.B&B..	Own.	Nb-Mec	1/2 Own..	BH..
42	Nash.....400	740	117	6.00/16	6-3 5/16x4 3/8	27.3	234.8	90-3400	5.61	42.2	CI..	Whit.	Als..	.....	AC..	Str....	.....	A...	USL.	P.B&B..	Own.	Nb-....	1/2 Own..	BH..
43	Oldsmobile.....F36	795	115	6.50/16	6-3 5/16x4 1/8	26.3	213.3	90-3400	6.00	39.2	CI..	Whit.	Ala..	No...	AC..	Car....	Hay..	D...	D....	P.B&B..	Own.	Nb-Mec	1/2 Own..	BH..
44	Oldsmobile.....L36	910	121	7.00/16	8-3x4 1/4	28.8	240.3	100-3400	6.20	40.2	CI..	Whit.	Ala..	No...	AC..	Car....	Buf..	D...	D....	P.B&B..	Own.	Nb-Mec	1/2 Own..	BH..
45	Packard.....36-120B	1075	120	7.00/16	8-3 1/4x4 1/4	33.8	282.0	120-3800	6.50	41.8	Al..	Mor..	Als..	.....	AC..	Str....	Old..	A...	Pre..	P.Long..	Own.	Nb-Mec	1/2 Own..	LH..
46	Packard.....8	2385	127-34-39	7.00/17	8-3 5/16x5	32.5	320.0	130-3200	6.50	37.9	Al..	Mor..	Als..	Pur..	AC..	Str....	Bur..	D‡..	Pre..	P.Long..	Own.	Nb-UP..	1/2 Own..	BP..
47	Packard.....Super 8	2990	132-39-44	7.00/17	8-3 1/2x5	39.2	384.8	150-3200	6.30	40.7	Al..	Mor..	Als..	Pur..	AC..	Str....	Old..	D‡..	Pre..	P.Long..	Own.	Nb-Spi..	1/2 Own..	BP..
48	Packard.....Twelve	3960	138-144	7.50/17	12-3 7/16x4 1/4	56.7	473.0	175-3200	6.40	44.3	Al..	Mor..	Als..	Pur..	AC..	Str....	Old..	A‡..	Pre..	P.Long†.	Own.	Nb-Spi..	1/2 Own..	BP..
49	Pierce-Arrow...1601	3195	138-144	7.00/17	8-3 1/2x5	39.2	385.0	150-3400	6.40	....	Al..	Whit.	Als..	Pur..	AC..	Str....	Buf..	D‡..	Wil..	P.Long..	WG..	Nb-UP..	1/2 Own..	Ste..
50	Pierce-Arrow...1602	3695	138-144	7.50/17	12-3 1/2x4	58.8	462.0	185-3400	6.40	....	Al..	Whit.	Als..	Pur..	AC..	Str....	Buf..	D‡..	Wil..	P.Long..	WG..	Nb-UP..	1/2 Own..	Ste..
51	Pierce-Arrow...1603	4795	147	7.50/17	12-3 1/2x4	58.8	462.0	185-3400	6.40	....	Al..	Whit.	Als..	Pur..	AC..	Str....	Buf..	D‡..	Wil..	P.Long..	WG..	Nb-UP..	1/2 Own..	Ste..
52	Plymouth P1	590	113	5.25/17	6-3 1/16x4 3/8	23.4	201.3	82-3600	6.70	38.8	CI..	Ch...	Ala..	Pur..	Bur..	Car....	NS..	A...	Wil..	P.B&B..	Own.	Nb-UP..	1/2 Own..	LH..
53	Plymouth.....P2	660	113	6.00/16	6-3 1/16x4 3/8	23.4	201.3	82-3600	6.70	37.9	CI..	Ch...	Ala..	Pur..	AC..	Car....	Own.	A...	Wil..	P.B&B..	Own.	Nb-UP..	1/2 Own..	LH..
54	Pontiac...Master Six	720	112	6.00/16	6-3 5/16x3 7/8	27.4	208.0	80-3600	6.20	37.6	CHI	Mor..	CHI.	No...	AC..	Car....	Own.	D...	Del..	P.Own..	Own.	m-Own..	1/2 Own..	BH..
55	Pontiac..DeLuxe Six	770	112	6.00/16	6-3 5/16x3 7/8	27.4	208.0	80-3600	6.20	36.8	CHI	Mor..	CHI.	No...	AC..	Car....	Own.	D...	Del..	P.Own..	Own.	m-Own..	1/2 Own..	BH..
56	Pontiac.....Eight	815	116 5/8	6.50/16	8-3 1/4x3 1/2	33.8	232.3	87-3800	6.20	40.0	CHI	Mor	CHI.	No...	AC..	Car....	Own.	D...	Del..	P.Own..	Own.	m-Own..	1/2 Own..	BH..
57	Reo...Fly. Cld. 1936	845	115	6.25/16	6-3 5/16x4 1/4	27.3	228.0	90-3400	6.50	39.4	Al..	Mor..	Als..	Pur..	AC..	Car....	Old..	D...	Wil..	P.B&B..	WG..	Nb-Spi..	1/2 Spi...	LH..
58	Studebaker...Dict. 6	755	116	6.00/16	6-3 1/4x4 3/8	25.4	217.8	90-3400	6.30	42.2	CI..	Dia..	Ly..	No...	Bur..	Str....	Bur..	A...	Wil..	P.B&B..	WG..	Nb-Spi..	1/2 Spi...	LH..
59	Studebaker.Dict. .P1	.....	116	6.00/16	6-3 1/4x4 3/8	25.4	217.8	90-3400	6.30	....	CI..	Dia..	Ly..	No...	Bur..	Str....	Bur..	A...	Wil..	P.B&B..	WG..	Nb-Spi..	1/2 Spi...	LH..
60	Studebaker...Pres. 8	1045	125	6.50/16	8-3 1/2x4 1/4	30.0	250.4	115-3600	6.50	41.6	Al..	Dia..	Ly..	Fram	Bur..	Str....	Bur..	D...	Wil..	P.Long..	WG..	Nb-Spi..	1/2 Spi...	LH..
61	Terrap'..DeL.& Cus.6	670	115	6.00/16	6-3x5	21.6	212.0	88-3800	6.00	(e)	CI°	Ge°.	Al...	No...	AC..	Car....	Old..	A...	Nat..	P.Own†.	Own.	Nb-Spi..	1/2 Own..	BH..
62	Willys.....77	425	100	5.00/17	4-3 1/16x4 3/8	15.6	134.2	48-3200	5.70	....	CI..	LB..	CI...	No...	AC..	Til....	Buf..	A...	USL.	P.B&B..	Own.	m-UP...	1/2 Own..	BM..

ABBREVIATIONS
°—Others Used
*—Generator and Starter Autolite
†—Power Clutch 1/2—Semi-Floating
3/4—Three Quarters Floating
(a)—Mod. 70—41.6; Mod. 75—42.0
Al—Aluminum Ala—Anode-processed
Als—Aluminum Alloy with Strut
(b)—Mod. 80—42.5; Mod. 85—41.5
(c)—De Luxe—42.2; Cust.—42.5
Ch—Chain
CHI.—Chrome Nickel Iron
Cl—Cast Iron
(d)—De Luxe—44.2; Cust.—43.7
dp—Double Plate
(e)—De Luxe—40.7; Cust.—40.2
F—Fabric FF—Full Floating
m—Metal Ly—Lynite
N—No or None
Nb—Needle Bearing
Os-Own—Semi-centrifugal
OT—Overdrive Transmission
P—(Clutch) Single Plate
s—Super Charged Tu—Tubular

ABBREVIATIONS (Make of Units)
‡—Owen-Dyneto for Generator and Starter
††—Displacement factor computed on basis of displacement, gear ratio, effective tire diameter and weight with normal load.
A—Autolite AC—AC Spark Plug
B&B—Borg and Beck
B&B—Ball and Ball (Carter)
BH—Bendix Hydraulic Operated
BM—Bendix Mechanical (Brakes)
BP—Bendix Power Operated (Brakes)
Buf—Buffalo Pressed Steel
Bur—Burgess Car—Carter
Ch—Champion Col—Columbia
Cu—Cuno D—Delco-Remy
Del—Delco Det—Detroit
Dia—Diamond
DL—Detroit Lubricator Co.
Exi—Exide
Fle—Fleming
G—Gemmer (Steering)
Gle—Globe
Han—Handy
Hay—Hayes-Ind.
HM—Hydraulic Mechanics
IH—Illinois L—Lavine
LB—Link Belt
LH—Lockheed Hydraulic (Brakes)

# of American Passenger Cars

Car Manufacturers and Supersede All Others Previously Published

Steering Gear Make	Compression Pressure at Cranking Speed (Lbs.)	Spark Plug: Make and Type	RINGS: No. and Width Comp.	RINGS: No. and Width Oil	Piston Pin Diameter	Piston Pin Locked in	VALVES: Head Diameter and Seat Angle: Inlet (Ins.)	Inlet Seat Angle (Degrees)	Exhaust (Ins.)	Exhaust Seat Angle (Degrees)	Stem Diameter (Ins.)	Operating Tappet Clearance: Inlet	Exhaust	Inlet Tappet Clearance for Valve Timing	Intake Valve Opens Before or After T.C.: No. of Degrees	No. of Flywheel Teeth	No. Teeth on Flywheel	IGNITION: Breaker Points Gap (Ins.)	Spark Plug Gap (Ins.)	Timing: Spark Occurs °TC	No. of Flyw. Teeth Spark Occurs TC	Breaker Housing	Rods Removed From	Crankpin Diameter (Ins.)	Crankpin Length (Ins.)	Capacity Crankcase (Qts.)	Capacity Cooling System (Qts.)	FRONT AXLE: Caster (Degrees)	Camber (Degrees)	Toe-in (Inches)	King Pin Inclination (Degrees)	Line Number
R...	....	Ch-J-6.....	2-1/8	1-1/8 1-3/16	7/8	R..	1 5/16	30	1 11/16	45	.342	010H	.010H	.012	7½B..	2¼B.	110	.018	.025	3B...	1B...	Au	B.	2 5/16	1¼	6	16	3½-4	1.5	1/8	7½	1
R...	....	Ch-J-6.....	2-1/8	1-1/8 1-3/16	7/8	R..	1 5/16	30	1 11/16	45	.342	010H	.010H	.012	7½B..	2¼B.	110	.018	.025	3B...	1B...	Au	B.	2 5/16	1¼	8	20	2-3	1.5	1/8	7½	2
R...	....	Ch-J-9.....	2-1/8	1-1/8 1-3/16	7/8	R..	1 5/16	30	1 11/16	45	.342	010H	.010H	.012	7½B..	2¼B.	110	.013	.025	3B...	1B...	Au	B.	2 5/16	1¼	8	20	2-3	1.5	1/8	7½	3
O...	....	Ch-C-7.....	2-1/2	1-1/8	1/2	R..	1 1/16	30	1 1/16	30	3/8	003H	.004H	....	TC...	TC..	80	.020	.020	.....	.....	Re	..	1 5/16	1¼	4	6	5	1¼	1/8 ± 1/16	1½	4
S...	....	AC-H9.....	2-1/8	2-1/2	3/8	R..	1 17/32	45	1 11/32	45	.371	.015	.015	.019	8B...	3¼B.	146	.015	.025	2B..	¾B..	½A	A.	2	1¼	6	13½	3-3½	-¼-+¼	1/16-1/8	4	5
S...	....	AC-H9.....	2-1/8	2-1/2	7/8	R..	1 17/32	45	1 7/16	45	.371	.015	.015	.019	14B..	6B..	156	.015	.025	10B.	4½B.	½A	A.	2¼	1 5/8	8	17	1¾-2¼	-¼-+¼	1/16-1/8	5	6
S...	....	AC-H9.....	2-1/8	2-1/2	7/8	R..	1 17/32	45	1 7/16	45	.371	.015	.015	.019	14B..	6B..	156	.015	.025	10B.	4½B.	½A	A.	2¼	1 5/8	8	17	1¾-2¼	-¼-+¼	1/16-1/8	5	7
S...	....	AC-H9.....	2-1/8	2-1/2	7/8	R..	1 17/32	45	1 7/16	45	.371	.015	.015	.019	14B..	6B..	156	.015	.025	10B.	4½B.	½A	A.	2¼	1 5/8	8	17	¾-1¼	-¼-+¼	1/16-1/8	5	8
S...	....	AC-K9.....	2-1/8	2-1/2	7/8	F..	1.87	45	1.62	45	.341	AA....	AA....	0	TC...	TC..	156	.015	.026	5B..	.....	Ad	A.	2.46	2 3/32	7	30	1½-2	¼-1	0-1/16	4°5′	9
S...	....	AC-K9.....	2-1/8	2-1/2	7/8	F..	1.87	45	1.62	45	.341	AA....	AA....	0	TC...	TC..	156	.015	.026	5B..	.....	Ad	A.	2.46	2 3/32	7	29	¾-1¼	0-½	0-1/8	5°38′	10
S...	....	AC-G6.....	3-3/32	1-1/2	7/8	P..	1.51	45	1.39	45	11/32	AA....	AA....	0	TC...	TC..	113	.021	.026	4B..	1¼B.	Ad	B.	2 5/16	1 5/8	9	19	¾-1¼	0-½	0-1/8	5°38′	11
S...	....	AC-G6.....	3-3/32	1-1/2	7/8	P..	1.51	45	1.39	45	11/32	AA....	AA....	0	TC...	TC..	113	.016	.026	4B..	1¼B.	Ad	B.	2 5/16	2¼	10	24	1½	1	1/16-1/8	4	12
O...	112	AC-K11...	2-1/8	1-5/16	.99	R..	1 13/32	30	1 13/32	30	11/32	.006H	.013H	.006	9B...	3¼B.	133	.018	.032	5B..	1¾B.	Ad	A.	2 5/16	1½	5	15	3 ± 1/2	1 ± 1/2	1/16 ± 1/16	‡	13
O...	112	AC-K11...	2-1/8	1-5/16	.99	R..	1 13/32	30	1 13/32	30	11/32	.006H	.013H	.006	9B...	3¼B.	133	.018	.032	5B..	1¾B.	Ad	A.	2 5/16	1½	5	15	0	¼	1/16-1/8	7¾	14
O...	112	AC-K11...	2-1/8	1-5/16	.99	R..	1 13/32	30	1 13/32	30	11/32	.006H	.013H	.006	9B...	3¼B.	133	.018	.032	5B..	1¾B.	Ad	A.	2 5/16	1½	5	15	2¾ ± 1/2	1 ± 1/2	1/16 ± 1/16	‡	15
G...	....	AC-K9.....	2-1/8	2-1/2	11/32	F..	1 17/32	45	1 11/32	45	.340	.006H	.008H	.010	TC...	TC..	146	.020	.025	TC..	TC..	Au	A.	2 5/16	1 5/8	6	19	1½	†	0-1/8	9¾	16
G...	....	AC-K9.....	2-1/8	2-1/2	11/32	F..	1 5/32	45	1 11/32	45	.340	.006H	.008H	.011	2B...	¾B.	146	.018	.025	TC..	TC..	Au	A.	2 5/16	1 5/8	6	22	1½	†	0-1/8	5¼	17
G...	....	AC-K9.....	2-1/8	2-1/2	11/32	F..	1 5/32	45	1 11/32	45	.340	.006H	.008H	.011	2B...	¾B.	146	.018	.025	TC..	TC..	Au	A.	2 5/16	1 5/8	6	17	2	††	0-1/8	5	18
G...	....	AC-KL9....	2-1/8	2-1/2	11/32	F..	1 5/32	45	1 11/32	45	.3.6	H .008	H .011	2B...	¾B.	146	146	.018	.025	5A..	2A..	Au	A.	2 5/16	1 5/8	6	17	2	††	0-1/8	5	19
G...	....	AC-KL9....	2-1/8	2-1/2	11/32	F..	1 5/32	45	1 11/32	45	.340	.006H	.008H	.011	2B...	¾B.	146	.018	.025	5A..	2A..	Au	A.	2 1/16	1 5/8	6	17	2	††	0-1/8	5	20
G...	....	Ch-J-9.....	2-1/2	1-1/8 1-3/16	7/8	F..	1 5/32	30	1 11/32	45	.342	.010H	.010H	.012	7½B..	....	....	.018	.025	3B...	.....	Au	..	.....	.....	.....	.....	.....	.....	.....	.....	21
G...	....	AC-K9.....	2-1/8	2-1/2	11/32	F..	1 17/32	45	1 11/32	45	.340	.006H	.008H	.010	TC...	TC..	146	.020	.025	TC..	TC..	Au	A.	2 5/16	1 5/8	6	19	1½	†	0-1/8	9¾	22
G...	....	AC-K9.....	2-1/8	2-1/2	11/32	F..	1 5/32	45	1 5/16	45	.340	.006H	.008H	.010	TC...	TC..	146	.020	.025	5A..	2A..	Au	A.	2 5/16	1 5/8	6	19	2	††	0-1/8	5	23
G...	....	AC-K9.....	2-1/8	2-1/2	11/32	F..	1 5/32	45	1 5/16	45	.340	.006H	.008H	.011	6A..	2½A.	146	.020	.025	4A..	1½A.	Au	A.	2 1/16	1	5	15	2	††	0-1/8	9½	24
R...	....	Ch-6M.....	3-1/16	1-1/8	1 1/16	F..	1 1/2	30	1 1/16	30	11/32	.015C	.015C	.025	6B...	2B...	119	.021	.025	1½"B*	.....	Ad	..	2 1/16	1¾	12	32	3	1	¼	....	25
O...	105	Ch-7.....	2-3/32	1-1/32	3/4	F..	1 13/32	45	1 11/32	45	5/16	.013C	.013C	....	9½B..	3B...	112	.013	.025	4B...	1¼B.	Au	A.	2	1 5/16	5	22	7	¾	1/8-1/8	8¼	26
R...	....	Ch-7.....	2-1/8	2-5/8	3/8	R..	1 3/8	30	1 11/32	45	5/8	.010H	.010H	.012	4½B..	1½B.	130	.018	.025	2B..	¾B..	Au	A.	1 11/32	1 11/32	5	11	2½	1	1/8	7½	27
R...	....	Ch-7.....	2-1/8	....	1/8	R..	1 3/8	30	1 11/32	45	1/8	.010H	.010H	.012	4½B..	1½B.	130	.018	.025	2B..	¾B..	Au	A.	1 11/32	1 11/32	5	11	2½	1	1/8	7½	28
R...	....	Ch-J-9.....	2-1/8	2-5/8	3/8	R..	1 3/8	30	1 11/32	45	1/8	.010H	.010H	.012	4½B..	1½B.	130	.018	.025	2B..	¾B..	Au	A.	1 11/32	1 11/32	5	15	2½	1	1/8	7½	29
R...	....	Ch-J-9.....	2-1/8	2-1/8	1/8	R..	1 3/8	30	1 11/32	45	1/8	.010H	.010H	.012	2A...	.....	130	.018	.025	TC..	.....	Au	A.	1 11/32	1 11/32	5	15	2½	1	1/8	7½	30
R...	....	Ch-J-9.....	2-1/8	2-5/8	1/8	R..	1 3/8	30	1 11/32	45	1/8	.010H	.010H	.012	4½B..	1½B.	130	.018	.025	2B..	¾B..	Au	A.	1 11/32	1 11/32	5	15	2½	1	1/8	7½	31
G...	....	Ch-J-8.....	2-1/2	2-5/8	3/4	F..	1 5/8	45	1 5/8	45	5/16	.006H	.008H	.010	10½B.	4B..	134	.020	.022	TC..	TC..	Au	A.	1 5/8	1 5/8	5	13	3½-4½	1-1½	0-1/8	7	32
G...	....	Ch-J-8.....	2-1/2	2-5/8	3/4	F..	1½	45	1 5/8	45	5/16	.006H	.008H	.010	10½B.	4B..	134	.020	.022	TC..	TC..	Au	a	1 5/8	1 5/8	7	23	3½-4½	1-1½	0-1/8	7	33
R...	107	Ch-C-7.....	2-1/8	2-1/2	7/8	F..	1 11/32	45	1 11/32	45	.340	.010	.013	.014	2B...	½B..	112	.018	.028	7B..	2¼B.	Ad	A.	2 1/16	1¼	6	18	1½	1	1/8-1/8	7¾	34
G...	113	Ch-C-7.....	2-1/8	2-1/2	7/8	F..	1 11/32	45	1 11/32	45	.340	.006	.013	.010	1A....	¼A..	109	.016	.028	7B..	2¼B.	Ad	B.	2 5/16	1¼	8	21¼	1½	1¼	1/8-1/8	8½	35
G...	100	AC-G8.....	2-1/8	1-1/8 1-3/16	7/8	F..	1 3/32	45	1 11/32	45	.341	.015	.015	.015	5A....	1½A.	104	.020	.023	10B.	3B...	Au	A.	2	1 11/32	7	19	2½	1½	1/8	7	36
S...	....	AC-K9.....	2-1/8	1-1/8 1-3/16	11/32	P..	1 5/8	30	1 13/32	45	11/32	.006C	.009C	.015	6A....	2½A.	145	.015	.025	8B..	3¼B.	Au	B.	2¼	1 3/16	7	16½	2	1	1/8	4½	37
O...	105	Ch-J-9.....	2-1/8	1-1/8 1-3/16	....	....	1.54	45	1.54	45	.311	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2½	.....	6	27	7	¾	1/8-1/16	8¼	38
O...	105	Ch-7.....	2-1/8	2-1/2	7/8	P..	1 5/16	45	1 5/16	45	5/16	.004C	.006C	.004	21B..	6¾B.	116	.020	.022	7B..	2¼B.	Au	B.	2½	1	12	32	1½	1	1/8-1/8	7½	39
G...	100	AC-K12...	2-1/8	1-1/8 1-3/16	7/8	F..	1 3/4	45	1 11/32	45	.372	.015H	.015H	.015	.....	.....	.....	.020	.025	.....	.....	.....	...	A.	2	1 7/16	7	17½	2½	1½	1/8	7	40
G...	90	AC-K12...	2-1/8	1-1/8 1-3/16	7/8	F..	1 11/32	45	1 11/32	45	.372	.015H	.015H	.015	.....	.....	.....	.020	.025	15B..	.....	.....	...	B.	2	1 7/16	8	21	2½	1½	1/8	7	41
G...	100	AC-G8.....	2-1/8	1-1/8 1-3/16	7/8	F..	1 3/32	45	1 11/32	45	.341	.015	.015	.015	5A....	1½A.	104	.020	.025	10B.	3B...	Au	A.	2	1 11/32	7	18	2½	1½	1/8	7	42
S...	....	AC-G9.....	2-1/8	2-3/8	11/32	P..	1 5/8	30	1 11/32	45	11/32	.008H	.010H	....	5B....	2B...	145	.020	.033	TC..	TC..	Au	A.	2	1 5/8	6	13	1½-2	1¼-1	1/8-1/8	5°51′	43
S...	....	AC-G9.....	2-1/8	2-3/8	11/32	P..	1 5/8	30	1 11/32	45	11/32	.008H	.010H	....	TC..	TC..	145	.015	.033	2B..	¾B..	Au	B.	2¼	1 5/8	7	16	1½-2	1¼-1	1/8-1/8	5°51′	44
O...	110	AC K-7	2-1/8	1-1/8	7/8	F..	1 13/32	30	1 13/32	45	11/32	.007H	.010H	....	7B....	.....	140	.020	.029	7B..	2B...	Au	A.	2 3/32	1 5/8	7	18	2	1	1/8-1/8	1½	45
G...	1'0	—or—	3-1/32	1-1/8	7/8	F..	1 1/2	45	1 1/2	45	.340	.004H	.006H	.004	30B..	9¾B.	118	.020	.029	6B..	2B...	Au	B.	2½	1 3/8	8	20	1	1	0-1/8	9	46
G...	110	Ch J-8	3-1/32	1-1/8	7/8	F..	1 5/8	45	1 5/8	45	.340	.004H	.006H	.004	30B..	9¾B.	118	.020	.029	6B..	2B...	Au	B.	2¾	1¼	9½	22	1	1	0-1/8	9	47
G...	110		3-1/32	1-1/8	7/8	F..	1 3/8	45	1 3/8	45	.340	AA...	AA...	.004	TC...	TC..	118	.020	.029	8B..	2¼B.	Au	B.	2½	2¼	10	40	1	1	0-1/8	9	48
R...	80	Ch-J-6.....	2-1/8	1-5/16	7/8	F..	1 3/8	45	1 7/16	45	.372	AA...	AA...	.010	5A....	1½A.	116	.018	.025	2B..	½B..	Ad	A.	2¼	1¼	10	25	¾	1	5/8	8	49
R...	85	Ch-J-6.....	2-1/8	1-5/16	7/8	F..	1 3/8	45	1 5/8	45	.372	AA...	AA...	.004	19B..	6B..	116	.018	.025	5B..	1½B.	Ad	A.	2 1/16	1 3/8	11	38	¾	1	5/8	8	50
R...	85	Ch-J-6.....	2-1/2	1-5/16	7/8	F..	1 3/8	45	1 5/8	45	.372	AA...	AA...	.004	19B..	6B..	116	.018	.025	5B..	1½B.	Ad	A.	2 1/16	1 3/8	11	38	¾	1	5/8	8	51
G...	....	AC-K9.....	2-1/8	2-3/32	11/32	F..	1 13/32	45	1 11/32	45	.340	.006H	.008H	.011	6A....	2½A.	146	.020	.025	4A..	1½A.	Au	A.	1 5/8	1	5	15	1-3	¼-3/4	0-1/8	9½	52
G...	....	AC-K9.....	2-1/8	2-3/32	11/32	F..	1 13/32	45	1 11/32	45	.340	.006H	.008H	.011	6A....	2½A.	146	.020	.025	4A..	1½A.	Au	A.	1 5/8	1	5	15	1-3	¼-3/4	0-1/8	9½	53
O...	....	AC-K7.....	2-1/8	1-5/16	5/16	P..	1 13/32	30	1 13/32	45	.310	.010H	.010H	.010	5B....	2B...	139	.020	.025	4B..	1½B.	Au	A.	2	1 7/16	6	15	1-1½	1¼-1¾	0-1/16	7½	54
O...	....	AC-K7.....	2-1/8	1-5/16	5/16	P..	1 13/32	30	1 13/32	45	.310	.010H	.010H	.010	5B....	2B...	139	.020	.025	4B..	1½B.	Au	A.	2	1 7/16	6	15	0	0-¼	0	8¾	55
O...	....	AC-K7.....	2-1/8	1-5/16	5/16	P..	1 11/32	30	1 13/32	45	.310	.010H	.010H	.010	5B....	2B...	139	.018	.025	4B..	1½B.	Au	A.	2	1 5/8	7	16¾	0	0-¼	0	8¾	56
R...	85	Ch-C-7....	3-3/32	1-1/4 1-3/16	11/32	F..	1 5/8	45	1 5/8	45	11/32	.007H	.008H	.012	5B....	2B...	150	.020	.025	2B..	¾B..	Au	⅝	2 5/16	1½	6	18	1½	1½	1/8	8	57
R...	105	Ch-8.....	2-1/8	1-5/16	7/8	R..	1 13/32	45	1 1/2	45	11/32	.016C	.016C	.020	15B..	5½B.	130	.020	.025	2B..	¾B..	Au	A.	2 5/16	1 5/8	6	14	1-1½	1½	1/8-1/8	9½	58
R...	105	Ch-8.....	2-1/8	1-5/16	7/8	R..	1 13/32	45	1 1/2	45	11/32	.016C	.016C	.020	15B..	5½B.	130	.020	.025	2B..	¾B..	Au	A.	2 5/16	1 5/8	6	14	(a)	1½	1/8-1/8	9½	59
R...	105	Ch-8.....	2-1/8	1-1/16	7/8	R..	1 13/32	45	1 1/2	45	11/32	.016C	.016C	.020	15B..	5½B.	133	.020	.025	TC..	TC..	Au	A.	1 7/8	1 5/8	8	17.6	(a)	1½	1/8-1/8	9½	60
G...	....	Ch-J-8.....	2-3/32	2-5/8	3/4	F..	1 5/8	45	1 5/8	45	5/16	.006H	.008H	.010	10½B.	4B..	134	.020	.022	TC..	TC..	Au	A.	1 5/8	1 5/8	6	13	3½-4½	1-1½	0-1/8	7	61
L...	....	Ch-C-7.....	3-3/32	1-1/16	7/8	F..	1 1/2	45	1 1/2	45	.371	.004H	.006H	.010	TC....	TC..	96	.018	.025	5A..	.....	Au	A.	1 5/8	1 1/2	4	9	1-2	2	1/32	7½	62

M—Midland Steeldraulic
m—Midland
Mar—Marvel
Mor—Morse **Mun**—Muncie
Nat—National
N—Northeast (Ignition)
Nb—Needle Bearing
N3—Noblitt Sparks **O**—Own
OH—Own Hydraulic
OM—Own Mechanical
Old—Oldberg

Pre—Prest-O-Lite
Pur—Purolator
R—Ross **Rock**—Rockford
S—Saginaw
Sal—Salisbury
Spi—Spicer
Spir—Spiral Gear
Ste—Stewart-Warner
Str—Stromberg
Til—Tillotson
Tim—Timken

UP—Universal Products
Wal—Walker
WG—Wagner Gear Co.
Whit—Whitney
Wil—Willard
Zen—Zenith

ABBREVIATIONS
‡ Rods below—Pistons above
† —(—¼ to +1/32)
†† —(1/32 ± ¼)
—7½ ± 1
(a)—(—¼ to + 3/32)
*—Measured on rim of flywheel
A—After
A—Above (Rod removal)
(a)—Above or below
AA—Automatic Adjuster
Ad—Advanced **Au**—Automatic
B—(Valve and Ignition timing)—Before
B—Below (Rod removal)
C—Cold (Tappet clearance)

F—Flat
F—(Pin locked in) Floating
H—Hot **L**—Link
Ma—Manual **N**—None
P—(Pin locked in) Piston
R—(Pin locked in) Rod
Re—Retarded
RZ—Rseppa (Gear Grinding Machine Co.)
S—Slide **s**—Sectors
TC—Top Center

Flame Travel

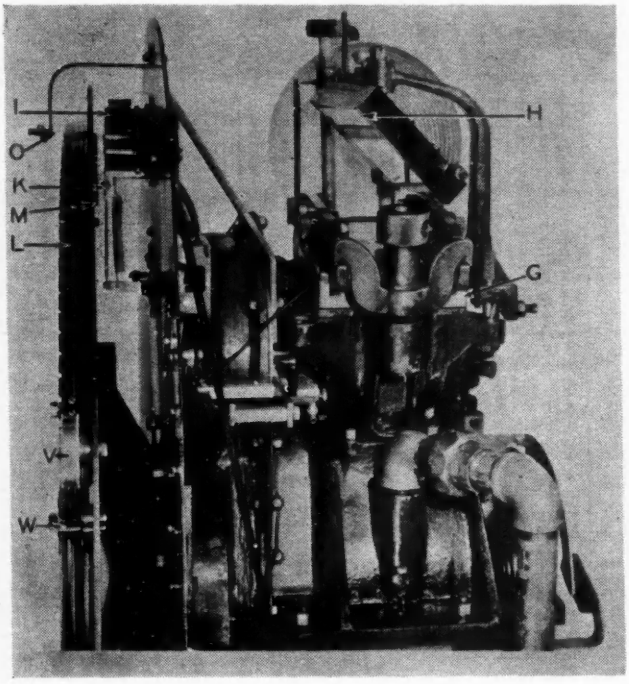


Fig. 1. A fused quartz window, 5¼ by 4 in. and ¾ in. thick, cemented in a heavy invar frame was the medium through which Rassweiler and Withrow were able to make high-speed pictures of actual internal combustion in the pictured test set-up.

CONSIDERABLE work is being done at present on methods of observing and photographing flames in the cylinders of internal combustion engines. This is a field in which Lloyd Withrow and Gerald M. Rassweiler of the G. M. Research Laboratories specialize, and at the Summer Meeting of the S.A.E. they presented a paper dealing with "Slow-Motion Pictures of Knocking and Non-Knocking Engine Explosions with a New High-Speed Camera."

Fused quartz was chosen as a window material, because previous experience with this material in small windows had shown that it withstands engine-flame temperatures satisfactorily when properly mounted. The window is in the form of a 5¼ by 4 by ¾-in. plate cemented into a heavy invar frame. As the coefficient of heat expansion of invar increases rapidly above 200 deg. F., the frame is water-cooled. To fasten the window in place on top of the cylinder, two clamps are drawn down by a nut and yoke. Since the lower surface of the window and window frame is flat, the side walls of the combustion space are cast integral with the cylinder block.

Some difficulty was experienced in sealing the window frame to the cylinder block without cracking it, because the cylinder block changed its shape slightly when the engine heated up. The strain necessarily introduced to make a gas-tight seal with a flat cylinder-head gasket on the uneven surface was great enough to break the window even though the window frame was very rigid. The combustion space is now sealed with a narrow copper-asbestos gasket ⅛ in. thick and ¼ in. wide, fitting in a tapered groove in both the cylinder block and the window frame. When the gasket is being used alone, a dead space appears between a portion of the lower surface of the window and the top of the cylinder block, and unless this is filled, some of the charge burns in it and the entire combustion process cannot be photographed. This space was therefore filled with a copper gasket and the window pulled down to give from 0.001 to 0.003 in. clearance, so that the entire explosion occurs beneath the clear section of the window. The compression ratio then is 4.7, while the cylinder dimensions are 2⅞ by 4¾ in.

A special high-speed motion picture camera was designed to meet the following requirements: First, the number of pictures per second must be extremely high if sufficient pictures are to be obtained during a single explosion to permit of a careful study of the flame propagation; second, as all of the light available for photographing the flames comes from the flames themselves, the optical system must be fast and efficient; third, the pictures must be sufficiently large so that details of the flame structure are not lost; and fourth, the angular position of the crankshaft at which the picture is taken must be accurately known.

To meet these requirements, the camera illustrated in Fig. 1 was built.

At the right side is the cylinder block of the engine with the quartz window mounted in place. The light from the flames in the engine comes up through the window, is reflected by the mirror, H, into the stationary lens, I, passes through the moving lenses, M, and is again reflected up to the film which is carried inside the overhanging rim of the disk, L. The disk is rotated at engine speed by the crankshaft. As each of the thirty small lenses, M, passes the stationary lens, a separate picture of the flames in the engine is recorded. With this arrangement of the optical parts, the image formed on the film by the lenses moves with the film during the exposure of each picture. K is a shutter which opens for one engine explosion only. The "focal-plane" shutter, O, controls the exposure time of each picture. Extra film is stored on the spool, W, and by means of the metering device, V, a fresh piece of film can be pulled into place after each set of pictures is photographed. When in operation, the camera is covered with a light-tight housing.

Figure 2 presents a typical set of flame pictures showing the flame propagation in a single explosion occurring when the engine was running 2000 r.p.m. on a non-knocking fuel, a blend of gasoline and benzene having been used in this instance because of the high luminosity of benzene flames. The spark advance was 28 deg. and the mixture, which contained about 80 per cent of the theoretical air, was slightly richer than that required for maximum power. On account of the unusually high wind resistance of the lens disk, the output of the engine, even though it was running at full throttle, was not sufficient to rotate the disk at 2000 r.p.m.; consequently, it was necessary to supply the additional power with the dynamometer. Pictures follow one another in the order in which they were taken from left to right and from top to bottom. The entire set of 30 pictures was exposed in 0.006 sec.

In the later pictures (from No. 17 on) near the spark plug and the exhaust valve is a region of high luminosity called the afterglow. There is already considerable evidence to indi-

Caught by Rapid Camera

Rassweiler and Withrow Get Slow-Motion Pictures of Internal Combustion; 30 frames in 0.006 sec. give accurate record of cylinder phenomena

cate that the gasoline is burned in the flame front insofar as permitted by the available oxygen and by chemical equilibrium under the prevailing conditions. This evidence consists of experiments with the sampling valve, which showed that the free oxygen at a point in the combustion chamber disappeared almost as soon as the flame arrived, and also of experiments with the spectograph, which showed that the spectrum of the flame fronts was characteristic of burning hydrocarbons, while the spectrum of the afterglow was characteristic of carbon dioxide. If the gasoline is burning in the flame front, then the flame-front portion of the charge should expand, thereby compressing the gases both ahead of, and behind the flames. Referring again to Fig. 2 and examining the luminous cloud of incandescent carbon, it will be noted that in pictures 13 to 18 the luminous area was pushed backward toward the spark plug by the expansion of the burning gases in the flame front. In frames 19 to 30 the motion of the cloud of incandescent carbon was reversed, the gas being pulled into the cylinder by the descent of the piston. The point of reversal of this motion in picture 19 occurred at the time of peak pressure in this explosion. At peak pressure a considerable portion of the charge was still unburned. In fact, combustion was not completed until the twenty-fifth or twenty-sixth picture, which was approximately 15 deg. of rotation past the time of peak pressure.

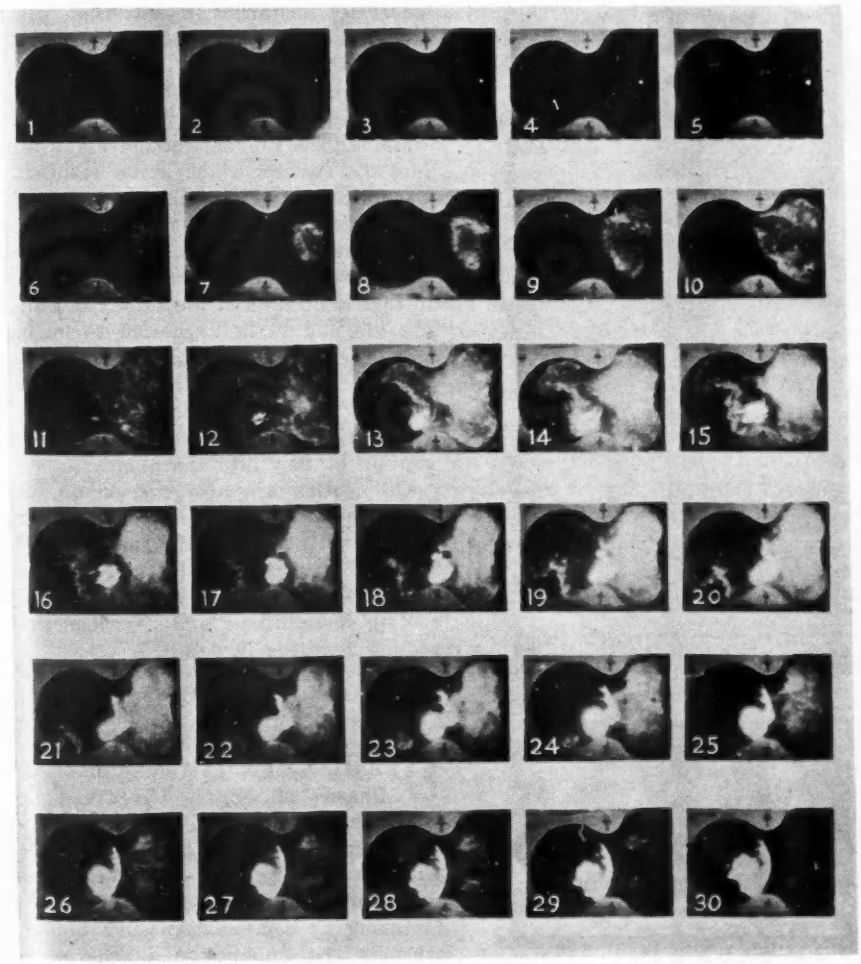


Fig. 2. The high-speed camera photographed sets of 30 exposures in 0.006 seconds

The afterglow in Fig. 2 is noteworthy. In pictures 13 to 18 the afterglow rapidly increased in brilliance in those portions of the charge which burned first and reached its maximum intensity at or slightly before peak pressure. The greater intensity of the afterglow over the exhaust valve as compared to its intensity over the intake valve in these pictures is probably connected with the mass movements of the charge already mentioned in connection with the unsymmetrical flame propagation. As the pressure decreased during the exposure of pictures 20 to 30, the afterglow rapidly decreased in intensity.

Now, in connection with the behavior of the afterglow, it is interesting to consider the temperature changes which occur in those portions of the charge which burn first, these temperatures having been measured by the use of the sodium line reversal method. Such

measurements have shown that the temperature in the gases which burn first continues to increase until slightly before maximum pressure. The continued temperature increase results from compression of the initially burned gas during the combustion of the remainder of the charge. At the end of combustion, the temperature in the gases which were burned first is higher than that in the gases which burn last; simultaneously, as shown by pictures 27 to 30 in Fig. 2, the gases which were burned first radiate light of greater intensity than those gases which burned last.

Fighting Headlight Glare

"POLAROID," the new material which has been developed for use in the lighting equipment of automobiles in an endeavor to solve the headlight-glare problem, was the subject of a paper by Edwin H. Land of the Land - Wheelwright Laboratories, Inc., at the SAE Summer Meeting. A description of the system, by which headlamps are provided with lenses which polarize the light sent out by them, and cars carry a screen of similar material to that of which the headlamp lens is made, which completely shuts off direct rays from an oncoming car, appeared in *Automotive Industries* some time ago. In the paper it was brought out that Polaroid is a shatterproof lamination of cellulose acetate between plate glass. The cellulose acetate, which polarizes any light passing through it, is of about the same thickness as movie film, and of much the same texture. With specimens shown by Mr. Land the transmission of light was said to range from about 30 per cent with the two specimens in the parallel position to about one-tenth of one per cent in the crossed position. The invisible ultra - violet rays are said not to pass through the Polaroid at all.

Cooling Systems for Trains

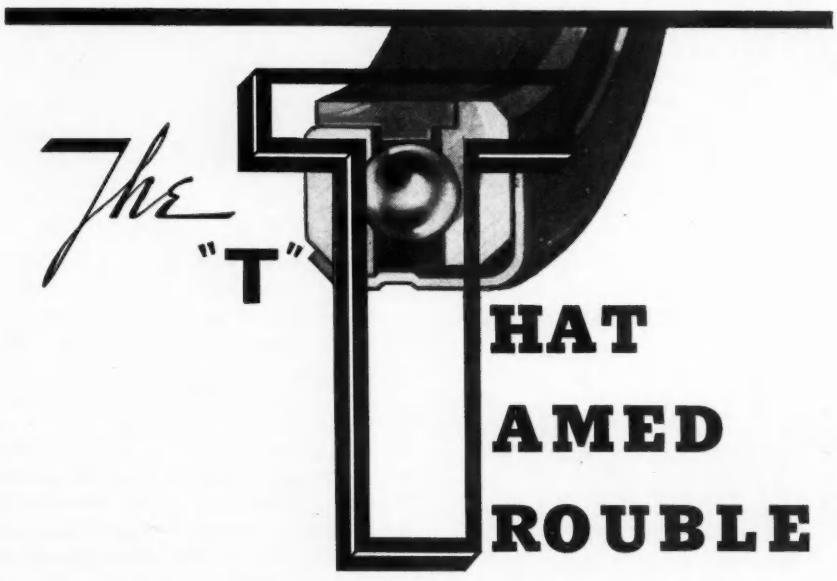
MANY technical difficulties had to be overcome in working out the cooling systems of streamlined trains, according to F. M. Young, president of Young Radiator Co., who read a paper on the subject at the SAE Summer Meeting. The radiators are generally installed in the roof over the engine, and air binding difficulties arose when this type of installation was first made. Provisions had to be made for the expansion of the heated water and to prevent the ingress of air into the system, which would result in the formation of air pockets, decreased cooling efficiency and corrosion of parts due to aeration. Precautions had to be taken to prevent freezing of the water in cold weather, and the supply of cooling air had to be regulated to maintain the desired temperature range under extreme conditions. In some cases it was found necessary to provide surge tanks to prevent an interruption of flow into the pump.

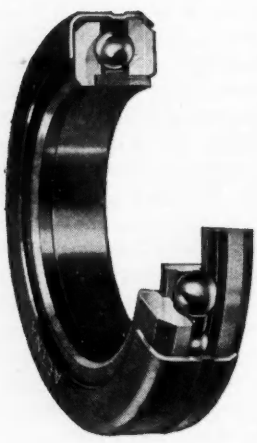
Oil coolers are also carried on all of these trains, and either water or air is used as the cooling medium.

Mr. Young showed slides of various high-speed streamlined trains and their cooling installations and described the cooling features in detail.

Metal Aircraft Construction

DISCUSSING "Manufacturing Phases of Metal Aircraft Construction," at the SAE Summer Meeting, Fred W. Herman of the Douglass Aircraft Co., Inc., said one of the distinguishing features of aircraft manufacturing as compared to such industries as the automotive, is the very limited number of units produced.





IN this unique T-shaped ball retainer rests the answer to the automotive industry's preference for the new Aetna "T" Type Clutch Release Bearing. Made of impregnated bronze and with the original lubricant imprisoned for "life" it obviates provisions for lubrication and assures a long, quiet life.

But, most important, it maintains a permanently true pitch line between raceways, thus abolishing the punishing eccentric thrust that accounts for much of the trouble characteristic of ordinary thrust-type clutch release bearings.

To the engineers who haven't yet adopted this better bearing, it must be significant that over a million 1935 cars and trucks have proven its superiority through the indisputable tests of time and actual use. Write for engineering information.

AETNA
BALL BEARING MFG. CO.
4608 Schubert Avenue
CHICAGO, ILLINOIS
DETROIT OFFICE
7310 Woodward Avenue

This precludes the adoption of real production methods and necessitates a preponderance of hand labor. At present it appears unlikely that this condition will improve in the near future, since most indications point to larger units rather than a greater number. It seems highly probable that metal-monocoque will continue to be the most used type of construction. We may expect that an increased number of parts will be fabricated on the power press, and that much assembly work will be accomplished by means of spot welding. Forgings and die castings will probably be used much more extensively.

---

100 Octane Fuel

FUTURE possibilities of 100-octane engine fuel were discussed in a paper by Frank D. Kline, First Lieutenant, Air Corps, Materiél Division, Army Air Corps, at the S.A.E. Summer Meeting.

Developments of the fuel industry made possible early in 1934 the production of commercial iso-octane on a large scale, at a cost sufficiently low to assure a promising future for iso-octane blends having an anti-knock value considerably above that available for service use in the past. Full-scale engine tests conducted by the Air Corps in 1934 showed that an increase of 15-30 per cent in power output is possible with Army 100-octane fuel over that obtainable with Army 92-octane fuel. For maximum output, a high degree of supercharge without the use of a very high compression ratio is desirable. To obtain maximum economy, a high compression ratio is essential, and the degree of supercharge need only be great enough to provide the necessary power for take-off and altitude performance. Results of high compression ratio tests conducted by Wright Aeronautical Corporation in a Cyclone engine, which have been reported by Raymond W. Young, indicate that specific fuel consumptions as low as 0.34 lb./B.H.P./hr. can be obtained in the cruising range without excessive engine temperatures, by the use of 100-octane fuel. This represents a saving of about 20 per cent over the best economy obtainable with Army 92-octane fuel.

Fuel and engine development are so closely allied that improvements in economy and output over a period of years must be attributed both to the better fuel available and to the improved design of engines.

As to future developments, Lieutenant Klein said there was every reason to believe that quality of fuel would continue to improve and that the 100-octane fuel was merely a stepping stone.

HOTFORM DIE STEEL
MEETS THESE REQUIREMENTS

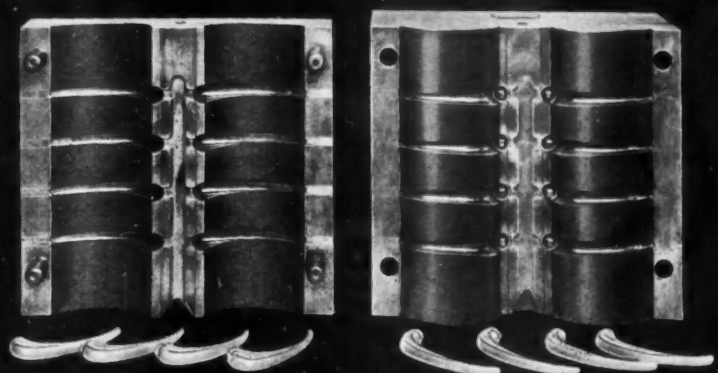
Must Air Harden from a Low Temperature

Must Have Practically No Movement

Must Not Scale Excessively when Air Cooled

Must Withstand Alternate Heating and Cooling without Fire Checking

The dies of Hotform illustrated greatly speeded-up production.



VANADIUM-
ALLOYS STEEL CO. LATROBE, PA.

Safety Trends in Body Design

F. R. FAGEOL, president of Twin Coach Company, in his paper on "Safety Trends in Body Design through Chassisless Construction," reminded his audience at the S.A.E. Summer Meeting that he has been using chassisless construction in his motor coaches since the Twin Coach was brought out in 1927. Mr. Fageol argued the advantages of chassisless construction at considerable length. By skin-stressing the body, he said, the load is taken at the maximum possible distance from the neutral axis of the vehicle, which is in accordance with fundamental principles of mechanics for the efficient use of materials. The body forms a thin yet rugged shell, upon which is mounted the running gear, and within which is mounted the powerplant and sit the passengers. This shell is not perceptibly deflected by any normal load, and the loads are transferred through the body as in a well-designed bridge truss or similar structure.

Torque is best resisted by a tubular structure, and although the classisless vehicle is not exactly a tube, it approaches the tubular form, with its solid metal roof, curved body sides, and rigidly-tied bottom structure. To further reduce torsional strains in the event of one of the front wheels passing over an obstruction, a structural X member is placed underneath the floor, and in addition to increasing the torsional rigidity, serves as a support for the floor.

The motor coach industry has it driven home to it day in and day out that it must keep weights down. A coach must justify its existence by the revenue it earns by carrying passengers, and every additional pound of weight means that its operating cost will be higher.

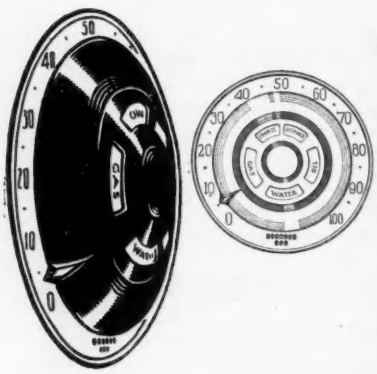
The passenger-car field has not felt the full force of this weight problem. It has long been argued that heavy cars are needed for a soft ride, but the coming of advanced suspension systems and improvement in the distribution of the weight of components have rendered this questionable. It is perfectly possible to discard the main frame of a conventional design, add a small proportion of this frame's weight to the present all-steel body at the proper points for reinforcement, and have an infinitely stronger, more stable, shock-resisting unit. This saves weight, increases the longitudinal and torsional rigidities, provides a safer vehicle, and simplifies the design with one stroke.

In a skin-stressed vehicle, the body sheet must necessarily completely cover the framework of the vehicle, to effect a proper distribution of load over the surfaces. Consequently, it is easy to obtain the proper lines and smoothness of surface necessary for a pleasing appearance. This possibility is illustrated by a comparison of present-day air liners with the old-fashioned "crate" of barnstorming days at county fairs.

As to the relation of chassisless construction to safety, Mr. Fageol pointed out that nothing is more important than a properly balanced, easily-handled vehicle. Easy handling and maximum road stability are particularly important in the events of sudden swerves and sharp turns at speed. Probably next in importance is the ability, in the unavoidable crash, to cushion the impact for the occupants. A comparatively thin, semi-resilient shell has just this shock-absorbing ability. At the moment of impact, localized at some point of the vehicle, the light structural members yield to

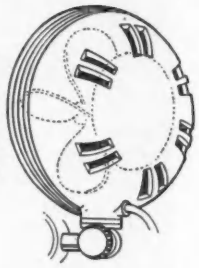
WHAT'S NEW IN *Plastics?*

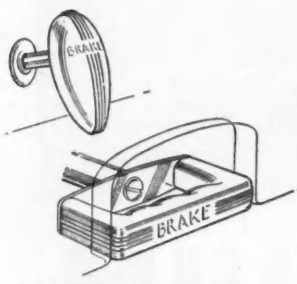
THIS MONTH: Instrument Dial, Fan Housing, Brake Grips



Convex Molded Dial: You'll find a domed or convex dial makes a most interesting instrument design. One way to do it is to mold a revolving ring for the speedometer instead of merely a thin hand, with the other indicators grouped in a stationary center disc, which carries out the dome-shape. Lends itself to red-light indicators for discharge, low gas, and heat, instead of calibrations. Durez permits holding in of partitions, inserts, hollow attachment for revolving disc, bezels, etc. Or speedometer ring can be made into domed disc, with red lights grouped underneath.

Defroster Fan Housing: Instead of dust-catching wire guard around windshield fan, why not mold cup-shaped housing of Durez? Improves appearance, keeps out kids' fingers, can't rust or lose its lustre. Matches car interiors. Light in weight and non-resonant. Rotor and bearing supports can also be molded in some types.





Brake Grips: 1937 cars tend toward dash brake grips, and Durez handles are pleasing to touch, amply strong, and the finish never wears off. Can match or blend with dash-board colors. Top version can be molded over core, if desired, and bottom one attaches to stiff metal plate, requiring no core. Lettering easily molded in.

NOTE: Samples of the parts shown above are not generally available. However, we are glad to consult with interested manufacturers on material selection and design of new Durez applications. Write General Plastics, Inc., 26 Walck Road, North Tonawanda, New York.

Choice of the Motor Industry **DUREZ** *Plastic Materials*

STEEL-*Conqueror* ☆

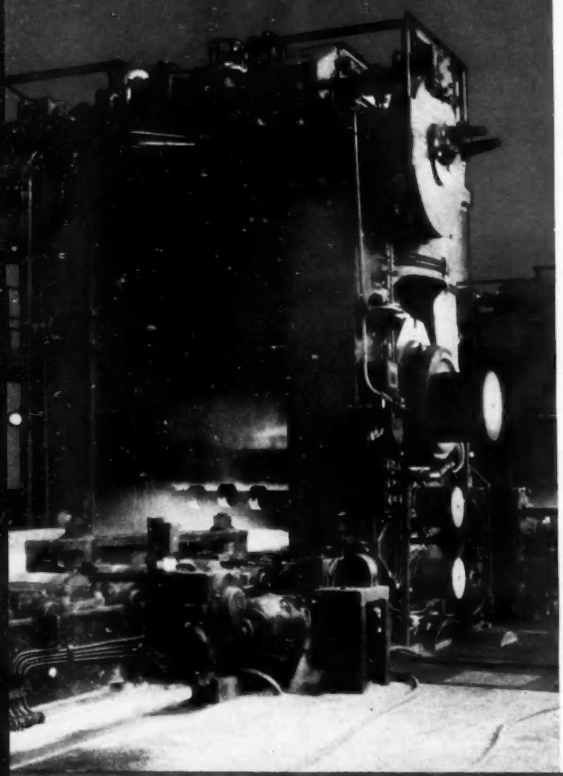
THE air is the latest of a long series of conquests by steel. The reliability that has brought high standards of safety, the low weight per horsepower that has opened the way to carrying substantial pay loads, are both largely the results of the development of new steels and refinements in steel manufacture.

It was steel's forerunner, iron, that provided the material for the first conquest of distance —by rail. It has been largely with steel that the multitude of minerals essential to industry have been wrested from nature's grip. Steel makes commercially feasible the processes in the chemical and oil industries involving terrific pressures. The fleet, graceful, economical automobiles of today are possible only because of the high development of steels and steelmaking.

Bethlehem has contributed largely to the advances in the steel industry that have laid the foundation for these achievements. Bethlehem is still working on developments to consolidate positions already attained by steel and to reach out into still other fields of usefulness.

BETHLEHEM STEEL

BETHLEHEM PRODUCTS FOR THE AUTOMOTIVE INDUSTRY



ALLOY STEELS

A CLOSE liaison that has been long maintained by Bethlehem with automobile metallurgists plays its part in the production and development of Bethlehem Alloy Steels. They consistently meet an ever more insistent demand for lighter, stronger metals, essential to more dependable and economical automotive transportation.

While Bethlehem Alloy Steels bring greater strength and durability, this close-working relationship with the industry has also often been of assistance in developing properties that simplify heat treating, facilitate machining or effect other economies.

TOOL STEELS

EVERY detail in the manufacture of Bethlehem Tool Steels is handled in the way that long experience has shown to result in the finest product. For each of the many exacting tool-steel uses in the automotive industry there is a grade of Bethlehem Tool Steel that will meet every demand.

SPECIAL-PURPOSE CARBON STEELS

EFFICIENT metallurgical control in melting and heat-treating as well as accurate control of rolling temperatures give Bethlehem Carbon Steels suitability to a wide range of responsible tasks. Special-Purpose Carbon Steels, as Bethlehem makes them, have strength and fatigue-resistance combined with easy machining qualities that make them the logical steels for an increasing list of automotive applications.

STAINLESS STEELS

BETHADUR and Bethalon cover practically every requirement for stainless steels, including the free-machining grades.

AUTOMOBILE SHEETS AND STRIP

BETHLEHEM'S new continuous sheet, strip and plate mill, now swinging into production, considerably broadens the scope of this company's service to users of flat-rolled steel.

Embodying all the latest refinements in rolling and finishing equipment, this new unit places Bethlehem in position to meet every requirement for sheets and strip, coiled and flat, including cold-rolled sheets for automobile doors, hoods, panels, and other major body sections; lamp and crown-fender stock; and a full range of both hot-rolled and cold-rolled strip.

The new mill is at Lackawanna, N. Y., in the Buffalo district—a location from which convenient, quick shipment can be made to principal centers of steel sheet and strip consumption.

SILVERY MAYARI ALLOY IRON

A NATURAL nickel-chromium pig iron with a high silicon content, offering a simple, economical method of making fine-grained machinable alloy-iron castings.

STEEL WIRE

BOLT and screw wire; spoke wire; spring wire.

ROLLED SECTIONS

SPECIAL rolled sections developed by Bethlehem can be used with decided savings in the manufacture of a wide variety of parts. The use of these sections, many of which have been designed for automotive parts, has brought economies to many manufacturers.

BOLTS AND NUTS

BETHLEHEM'S large, self-contained Lebanon Plant is devoted wholly to the manufacture of bolts, nuts and related products, and produces a complete range of standard items, and many "specials."

BETHLEHEM STEEL

BETHLEHEM STEEL COMPANY

General Offices: Bethlehem, Pa. *District Offices:* Albany, Atlanta, Baltimore, Boston, Bridgeport, Buffalo, Chicago, Cincinnati, Cleveland, Dallas, Detroit, Honolulu, Houston, Indianapolis, Kansas City, Los Angeles, Milwaukee, New York, Philadelphia, Pittsburgh, Portland, Ore., Salt Lake City, San Antonio, San Francisco, St. Louis, St. Paul, Seattle, Syracuse, Washington, Wilkes-Barre, York.
Export Distributor: Bethlehem Steel Export Corporation, New York.

the blow and gradually increase the loading through the exterior sheet and short tie members connecting the tees and angles.

In concluding his paper, Mr. Fageol said several new processes and materials were under development which promised to prove valuable in chassisless design. The present motor coach body is essentially a riveted job, with the body sheet laid over the skeleton frame. This construction is not practical for passenger cars, which must have an absolutely smooth exterior surface. The Haskelite Company has been refining the projection-welding process and has succeeded in welding metal without leaving blemishes or scars on one side, and it was the author's opinion that with the final development of this welding process would come one of the most radical revisions of automobile structure the industry had ever seen.

From the safety standpoint, as well as from that of light weight and low cost, the ideal design of an automobile would consist of a dual body shell to which axles, engines and all other parts would be attached by appropriate means, and in which all semblance of a chassis would have disappeared. The dual body structure would consist of an interior body lining and a complete outer body shell, both stamped out of very light-gage steel, the interior shell being, perhaps, an inch smaller in overall dimensions than the exterior shell, the shells being welded together by this new projection-welding process, which would leave no exterior scars, and the two shells then joined together by the offsets in the stamping necessary for windows, doors, etc.

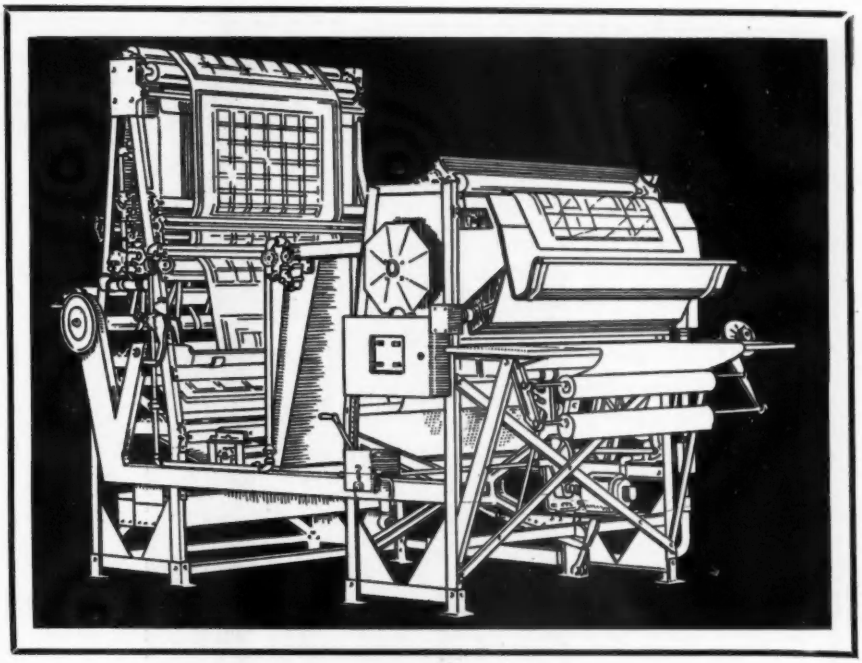
The Horizons of Business

(*Continued from page* 841)

was sterile, society stagnant and living standards at appalling levels. New experimentation is not necessary. The laboratory of history gave Just Price a thorough trial. Modern progress dates from the time when intelligent men rejected the primitive theory of a fixed and uniform income and established price as the great equalizer.

If the law states how much a ton of coal shall cost, it must also make some provision for the coal produced at that price and not purchased, for price cannot function both as a guarantor of income and an equalizer of supply and demand. Relief policy has established $80 a month as the just, minimum price of labor. At this price a substantial, if minor, fraction of the working population cannot be employed. This fraction never has been employed at that price. It is far above the return which the individual components of this fraction received in the prosperous twenties. Harry Hopkins is trying to establish a just price for labor, even as the old Farm Board fixed a fair price for farm products, even as Congress is now seeking to legislate a fair price for coal. Under the concept of just price there developed mounting surpluses of cotton and wheat. There is now a growing surplus of idle labor (except where minimum returns have been ditched, as in New Jersey).

With a just price for coal the effect will be somewhat different unless Congress appropriates funds with which to make such a price effective for all coal produced, even as the Farm Board did for cotton and wheat. The coal which the miners will produce under the stimulus of the fair price prospect will not all be bought at that price. It will tend to accumulate in the hands of the producers. Nor will the surplus be retained just because the law says it may not be sold at less than the fair price. It will be bootlegged. And that is food for thought.



Better BLUE-PRINTS *Faster*
AND AT *Lower* COST!

Yet The Purchase Price Is $1000 Less

Here is a high-grade Continuous Blue-Printing, Washing and Drying Equipment that will amaze you by its performance—surprise you with its extremely low initial cost and economical operating expense.

Model "11" was built to do a job—a good job—and it does that job remarkably well wherever it is installed. It turns out high-grade blue-prints, negatives, blue-line and brown-line prints rapidly and at low cost per square foot.

It can do the same for you. Investigate today. Write for complete Model "11" information and prices now. There is no obligation.

THE C. F. PEASE COMPANY
835 NORTH FRANKLIN STREET
CHICAGO, ILLINOIS

PEASE MODEL "11" MACHINE

GM May Sales Continue High

Only Small Seasonal Dip in Domestic Sales; Dealer Stocks Decline and Foreign Shipments Are Up

While General Motors sales to consumers in the United States for May showed a small seasonal decline of less than three per cent, they continued well above sales to United States dealers, thereby reducing stocks still lower in anticipation of slack sales preceding the new models. Sales to United States consumers amounted to 194,628 units compared with sales to United States dealers of 187,119. The figures represent an increase of approximately 78 per cent over the same month last year both in consumer and dealer sales.

It is of interest that General Motors' dealers stocks in the United States have increased a total of but 17,433 units since Jan. 1, compared with an increase of 48,308 units during the same five months of 1935.

Despite the seasonal decline in domestic consumption, sales to foreign dealers in May amounted to 35,484 units and showed a slight increase both over April and over May, 1935.

The accompanying table shows the General Motors sales picture, domestic and foreign, for May and for the first five months.

	May, 1936	April, 1936	May, 1935	Five Months 1936	Five Months 1935
Sales to world dealers.....	222,603	229,467	134,597	952.237	707,372
Sales to U. S. dealers.....	187,119	194,695	105,159	792,128	559,361
Sales to U. S. consumers.....	194,628	200,117	109,051	774,695	511,053
Change in U. S. dealer stocks	—7,509	—5,422	—3,892	+17,433	+48,308
Sales to foreign dealers.....	35,484	34,772	29,438	160,109	148,011

Forgings with a background—

Behind every Wyman-Gordon forging stands diligent scientific examination of every bar of steel—continuous laboratory control of all processes.

WYMAN-GORDON

Worcester, Mass. Harvey, Ill. Detroit, Mich.

Tire Industry's Proposed Code

(*Continued from page* 823)

of misleading customers with respect to grade, quality, etc.

6—Claiming to be "an authorized dealer" when such may not be the case.

7—Advertising or representing the handling of "all standard makes" when such is not the case.

8—Falsely representing in the sale, or offering for sale, of change-over tires and tubes that such tires or tubes are new and unused.

9—Secret payment of allowances, rebates or refunds, commissions or unearned discounts or secretly extending to certain purchasers special privileges not extended to all purchasers under like conditions and terms.

10—Withholding from, or inserting in, the invoice or sale ticket, statements which make the invoice or sales ticket a false record, wholly or in part, of the transaction represented on the face thereof.

11—Advertising recapped, rebuilt or retreaded tires as new or unused tires.

12—Failing to differentiate between wholesale and retail merchandise, when both are sold in the same establishment.

13—Extending to any individual, firm or corporation cost consideration lower than to the retail tire dealer whose principal purpose is for resale.

14—Failure to brand product on sidewall with name of manufacturer and trade name of tire whether first, second, third, fourth or fifth line, and whether four or six ply. All special brand tires to be branded in accordance with nearest corresponding line of tires produced by the manufacturer thereof.

15—Guaranteeing prices for more than 30 days.

Proposed rule No. 1 is based upon the recent Federal Trade Commission decision in the Goodyear-Sears Roe-

buck case, the Commission having found Goodyear guilty of illegal price discrimination under the Clayton Act.

Proposed rule No. 15 is patterned after the application for complaint, now before the Commission, as sponsored by the N.A.I.T.D.

Eastern Administrators Name Engineering Group

Michael A. Connor, chairman of the Eastern Conference of Motor Vehicle Administrators, announced this week that personnel of the new engineering committee, approved at the Philadelphia convention, May 11 to 13, would be the same as that of the former headlight committee.

The group includes A. W. Devine of Massachusetts, W. L. Cross, Jr., of Connecticut, A. W. Kallmeyer of New York, Carroll A. McShane of Pennsylvania, James J. Shanley of New Jersey and F. C. Caldwell of Ohio State University, Columbus.

New Japanese Cars to Have 6-Cylinder L-Head Engine

The Toyada car, which is to be produced in Japan, will have a six-cylinder, L-head engine, according to reports from Tokyo. The wheelbase will be 112 in., and the base price 3385 yen (approximately $990).

Further details concerning the new car will not be available until its formal announcement next month, but it is understood it will incorporate various features of the Ford and Chevrolet.

Ford's New Laboratories

(*Continued from page 823*)

with stainless steel to assure freedom from corrosion and to carry out to the utmost the Ford philosophy of good housekeeping.

This ideal is carried out still further by lining the walls with a border of stainless sheet immediately above the fixtures so that the entire interior carries out the bright, spotless motif. Electric hot plates, sinks, and similar stations are built flush with the work benches so that no protuberances will interfere with the clean unbroken lines of polished metal, facilitating also the cleaning of these surfaces.

One of the outstanding features of this department is a relatively huge salt spray chamber about 7 by 9 ft. extending clear up to the high ceiling. This is undoubtedly the largest salt spray chamber in use in the industry and it can accommodate easily any unit of the car. An interesting feature of the chamber is the use of glass brick for lining the interior walls while the entire enclosure is made visible through large panes of plate glass.

A separate laboratory in an adjacent portion of the same building houses complete facilities for ceramic research. Here will be found equipment for investigation of the ceramics used in the vast Ford industries, particularly such items as furnace linings, heat resistant brick, vents, etc. The laboratory aims at the development of the most satisfactory material compositions and manufacturing techniques for the solution of routine or extraordinary problems. This information is then made available to the suppliers.

The new Ford laboratory is undoubtedly unique for its installation of the Profilograph with which readers of AUTOMOTIVE INDUSTRIES are familiar. This instrument will be used in many ways in the investigation of the character of finish of machined surfaces and it is quite likely that such information may be ultimately used in the standardization of metal finish in the machine shops. This has been the objective in metal cutting industries for many years and the Ford laboratories may be in position to chart the scope of such activity with great benefit to all metal cutting establishments.

Illustrations of the interior of the laboratories are shown in this article. Attention is drawn particularly to the set of X-ray diffraction patterns reproduced here, with captions noting the range of usefulness of the X-ray in industrial research and development.

CELORON
SPOKE GEARS

are Now Approved for timing . . . .

Every year automobile motors are improved. They run more quietly, more smoothly. Chassis and bodies too are being constantly redesigned to provide quieter, smoother driving. The "Spoke" Celoron Silent Timing Gear keeps the timing device abreast of the other advances in automobile design.

Several automobile manufacturers have recognized this fact and have adopted the "Spoke" Celoron Silent Timing Gear as equipment. At no additional cost they have incorporated another feature in their motor design to insure the permanence of its quiet, smooth-running power.

We would like an opportunity to work with you in designing a "Spoke" Celoron Silent Timing Gear for your motor. You will find our "Engineering Data Book" helpful. May we send you a copy?

CONTINENTAL DIAMOND FIBRE COMPANY
NEWARK DELAWARE

Patman-Robinson Bill

(*Continued from page* 822)

than those enacted elsewhere in the country, for the purpose of eliminating a competitor. The conferees struck out the amendment of Senator Vandenburg which would have exempted from the terms of the bill manufacturers in the purchase of their supplies.

As a sop to cooperatives, growing out of complaints of farm cooperatives, the conferees agreed upon a provision giving cooperatives the right to return to their members, producers or consumers the whole or any part of the net earnings or surplus resulting from trading operations in proportion to their purchase or sales.

While the bill as agreed upon bars discrimination in price between different purchasers of commodities of like grade and quality, where the effect would be to substantially lessen competition, it permits differentials which make only due allowance for differences in the cost of manufacture, sale or delivery resulting from the differing methods or quantities. There is, however, a string on this provision, for the Federal Trade Commission is empowered to fix quantity limits "where it finds that available purchasers in greater quantities are so few as to render differentials . . . promotive of monopoly."

Permission is also granted for the selection of customers and to lower prices or furnish services done in good faith to meet an equally low price of a competitor or the services of a competitor. The Senate provision for classification of customers was eliminated. This provision was struck from the House bill before its introduction upon complaint of farm cooperatives.

In Mechanics Roller Bearing Universal Joints, integral keys transmit the torque. These keys, not bolts or screws, do the driving. Design is simple and compact, machining highly accurate, balance assured, lubrication provision generous, assembling simple. Mechanics Roller Bearing Universal Joints are rugged, dependable, economical. Used in leading passenger cars, trucks and busses. Investigate. Write, today, for complete information on Mechanics Universal Joints.

MECHANICS UNIVERSAL JOINT DIVISION
Borg-Warner Corp. 1301 18th AVE., ROCKFORD, ILLINOIS

English Tourists to Bring Own Cars for U. S. Visit

The first of four parties of English motorists participating in a "rally" sponsored by the Junior Car Club of England will arrive in New York on July 27, accompanied by about 40 automobiles. In a ten-day tour in their own automobiles the party will visit, after two days in New York, Washington, Uniontown, Cleveland, Detroit, Niagara Falls, and Toronto, re-embarking at Montreal for the return trip to England.

Succeeding parties, each including about 40 motorists, some if international prominence, will arrive at intervals of about two weeks, reversing the itinerary in one or two cases. Arrangements for the trip are being handled in London by Auto-Cheques, Inc., and in New York by Europe-on-Wheels, Inc., and the foreign travel division of the American Automobile Association.

Single Wheel Pressed Steel Trailer Made by Peninsular

A new pressed-steel trailer, designed for quantity production, has been announced by the Peninsular Metal Products Corp., Tralette division, and is to be known under the trade name Tralette. It has a single ball-bearing wheel mounted on an axle fixed in position, and is attached to the rear bumper in

The Tralette pressed steel trailer made by Peninsular Metal Products Corp.

such a way that it can swivel around a vertical axis through the coupling when negotiating turns. It is claimed that when the Tralette tilts, the center of gravity remains vertically over the center of ground contact of the wheel.

The body, which has a capacity of 61 cu. ft., is said to water and dustproof. It is low enough not to obstruct rear vi-

sion and is equipped with a dome light. With a special canvas extension, including zipper doors and screens, two persons can sleep in it comfortably. When not in use the trailer can be detached and no equipment remains on the rear bumper of the car. It drops on two front legs equipped with caster rollers and may be easily moved about. It weighs 275 lb. empty and can carry a pay load of 750 lb. The retail price is $165, and the manufacturer plans to sell it through automobile dealers.

General Malleable Corp. Absorbs 2 Waukesha Firms

General Malleable Corp., Waukesha, Wis., has announced absorption of the Claffey Casting Co., gray iron founder, and Werra Aluminum Co., both of Waukesha, under the general management of L. D. Harkrider, president of General. Bernard C. Claffey continues as manager of the gray iron division, specializing in small cylinder blocks and other automotive castings. Julius Werra, son of Conrad Werra, founder of the aluminum casting industry in America, will manage the Werra division, which has been in receivership under his direction. The Claffey shop, until now occupying part of the General foundry plant, is being moved into the Werra foundry, one of the largest in the country.

An interesting pamphlet* has just been released by the Landis Machine Co., Waynesboro, Pa., which gives actual **production results** of the company's full line of **threading equipment.** The new collapsible taps are included.

Complete **capacity and size specifications of the MotoReduceR line,** gear reduction units manufactured by the Philadelphia Gear Works, are contained in Bulletin MR-36,* just issued by the company. Specifications of two new sizes (No. 405 and No. 444) are included.

With the May issue, Studebaker Corp. resumes publication of **"The Wheel"***—famed house organ which at one time had a circulation of more than a million copies.

The current issue of Aluminum Co.'s News Letter carries announcement of a new booklet, **"The Riveting of Aluminum."*** Strength characteristics, procedure, and design are included as well as a special section on aircraft riveting.

Bulletin No. 71-F of the Niagara Machine & Tool Works gives complete description of the company's line of light **Power Squaring Shears** in capacities up to No. 10 gage soft steel. Other bulletins are available covering other items of the line.

Newest developments in the **DeVilbiss Compressor line** are described in the company's catalog, "CG." Complete specifications and performance data are contained in the new issue.

Industrial Diesel Engines and De-aerating Heaters for steam boiler **Feedwater Heating** are the subject of recent pamphlets* distributed by Worthington Pump and Machinery Corp., Harrison, N. J.

Four pages of Hexagonal **Socket Type Set and Cap Screw Standards** have recently been distributed by the Holo-Krome Screw Corp., Bristol, Conn., as a supplement to the company's catalog. Complete dimensional standards are given for wrenches as well as screws of this type.

*Available through AUTOMOTIVE INDUSTRIES.

Trailers to the Front

(*Continued from page* 839)

more to adopt automotive practice, and the automobile industry will be one of its strongest allies. With distribution through automobile dealer channels, installment selling and yearly models a fact, repossessions and trade-ins alone are needed to bring the industral parallel up to date. The future may see combination offers of car and trailer, with a single spare wheel and tire, and the least to be expected is a universal trailer hitch standard equipment on every car.

A side-kick has been born. Don't overlook it.

POSITIVE
. . . LUBRICATION FOR "SHOCK POINTS"
Due to the microscopic fineness of "dag" colloidal graphite, it readily flows with the oil to main and connecting rod bearings forming a positive, self-lubricating surface on all the "shock points". + + This graphoid surface greatly helps to hold the oil in place. + + It also functions as a dry lubricant, should a forgetful driver allow his oil level to go below the danger point. + + These valuable characteristics of lubricants containing "dag" colloidal graphite go a long way toward assuring extra protection for automotive engines.
Ask your oil supplier about his colloidal-graphited brands today.
ACHESON COLLOIDS CORPORATION
Founded (1908) as Acheson Oildag Company
PORT HURON MICHIGAN
A photograph of electron diffraction pattern which identifies a graphoid surface on cast iron.
dag
COLLOIDAL PRODUCTS
©1936, A.C.C.
COLLOIDAL GRAPHITE

ACHESON COLLOIDS CORPORATION
Port Huron, Michigan
Please send gratis story on "dag" colloidal graphite.
Name .....
Address .....
City .....

What Price SERVICE?

Obviously you want to create bearing service—not bearing replacement service—when you purchase original equipment. Today a vast and diversified replacement industry exists by reason of the short life of motor car bearings and other parts.

To safeguard the interests of its customers in the automotive industry, this company for years has maintained an intensive research activity in connection with automobile bearings in constant, daily collaboration with the engineering departments of all leading motor car manufacturers.

In bearing materials, design and lubrication, radical advancements at no increase in costs have been made recently. We can help you interpret these as they apply to your requirements and will gladly work with you in the making of bearing specifications based on this new knowledge. Such collaboration does not obligate you in any way. The Bunting Brass & Bronze Company, Toledo, Ohio, Branches and Warehouses in all Principal Cities.

BUNTING Bunting **Quality**

BRONZE BUSHINGS • BEARINGS
MACHINED AND CENTERED BRONZE BARS
ANTI-FRICTION METAL